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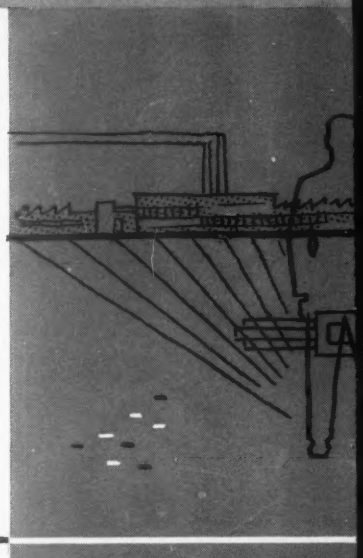

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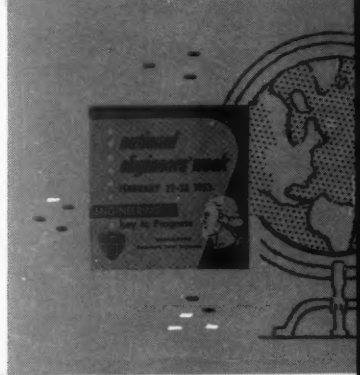

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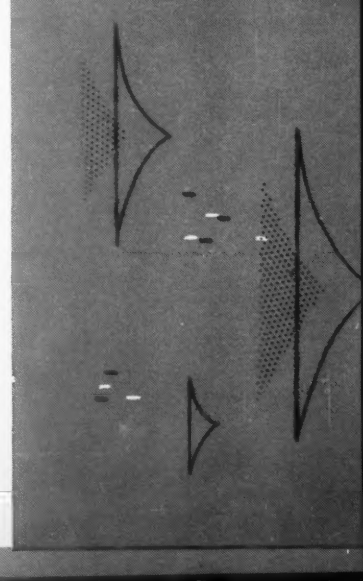

How the construction industry can b made more stable: a review of the fact

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- **HOW the industry operates**
- **WHY the industry fluctuates**
- **WHAT public policy will steady**
- **HOW private measures can help**

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CONTENTS

I: The Nature and Environment of Construction Activity
1. Definition and Measurement
2. Characteristics of the Products of Construction
3. Characteristics of the Demand for Construction
4. The Cost of Construction
5. Initiation and Direction of the Construction Process
6. The Organization of the Construction Industry

II: Facing the Problem of Stability
7. Effects of Instability on the Construction Industry
8. The Problem of Stabilization
9. Instruments of Stabilization
10. Potentials of Stabilization

APPENDICES

STABILIZING CONSTRUCTION

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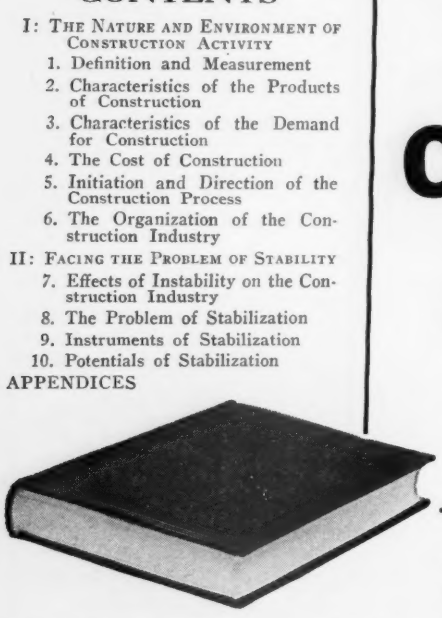

These are a few of the many questions which the book answers:

How are technological advances going to make the industry less sensitive to lumber price changes?

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Do peaks and valleys in demand for residential and non-residential construction coincide?

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How do financing practices in building lag behind those in other industries?

How is the Federal Government working to settle jurisdictional disputes among different building-trade unions?

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The book relates construction to the economy as a whole, showing that the economy acts more upon it than it does on the economy. You are shown measures to achieve relative stability in times of general stability or minor difficulties, and special anticyclical measures for use in the construction area specifically, if a serious decline were to hit both the general economy and the construction industry.

Look for penetrating analyses

The authors give you an authoritative analysis of the industry, its organizations, methods, and environment. Then, against this background, they present sound and penetrating analyses of the industry's problems and potentials.

You'll find guidance in special areas

Especially interesting are the study of fluctuations in demand for various components as distinguished from the industry as a whole; the analysis of factors tending to keep construction costs up; the material dispelling the idea of an 18-20 year construction cycle; the cautions as to the value of public works as an anticyclical device and the analysis of market prospects for construction.

The book includes appendices giving the most rounded assembly of basic data anywhere available on the industry.

The authors bring a wealth of experience

MILES L. COLEAN, now a Consulting Economist, is the author of *American Housing*, published in 1944, and of a study of the *Impact of Government on Real Estate Finance in the United States*, published in 1950. He is a Fellow of the American Institute of Architects, and former Assistant Federal Housing Administrator.

ROBINSON NEWCOMB, at present on the staff of the Office of Defense Mobilization, formerly served as Construction Economist on the staffs of the Council of Economic Advisers and the Under Secretary of Commerce for Transportation.

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Letters

Public Power . . .

Dear Editor:

I am writing to protest the inclusion of the article by P. L. Smith in the December copy of AMERICAN ENGINEER.

I am a system engineer for an R.E.A. electric cooperative at Lewiston, Idaho, so naturally I don't view things in the same light as Mr. Smith. This does not mean that Mr. Smith is necessarily wholly wrong, of course, but I do feel that you have no excuse for printing such propaganda as Mr. Smith has thrown out this time. Since the thing has been done however, you should now open your pages to a public power proponent. The public-private power question is a political one and has no place in the pages of a technical publication. It is one which should be decided by the public, in newspapers and at the polls. However, since you have already run several pages of such a biased and froth-filled viewpoint, the least you can do now is to take an unprejudiced stand and run an article by someone on the other side.

I am particularly concerned about this matter because I am afraid that it catches many new engineering school graduates at a time when they have no first hand knowledge of the question and are therefore unduly influenced by this kind of talk. When I got out of engineering school with a nice shiny diploma, in 1941, I was thoroughly convinced that T.V.A. was a monstrous beast which had all of the features of the first step to dictatorship. (My senior professor was an old private-power company man, don't you see.) Since then I have done a little gandering around on my the T.V.A. setup appear to far outweigh any harm it may have done. Articles such as Mr. Smith's were largely responsible for my misinformed point of view in 1941.

I didn't realize, until I read Mr. Smith's story, that I was supporting an organization which had gone on record with a resolution opposing public ownership of power-generating and transmission facilities. No doubt the reason why the resolution got thru was because the group of state representatives were comprised primarily of men who worked for or were in sympathy with private power problems and practices.

If a vote were taken thru the general membership of NSPE, no doubt the majority of engineers would vote to stay off the record because this is a society of technicians and scientists and should not go into print publicly on political question. . . .

ROBERT S. DOLE, P.E.,
Lewiston, Idaho.

► We cannot agree that it was wrong for us to print the Smith piece. The American Engineer (as the voice of the National Society of Professional Engineers) is *not* a technical publication but interested in the professional aspects of engineering. The Society has always felt that engineers should become more conscious of the social implications of their work. We feel we should present all sides of such controversial issues as Valley developments, public power, the St. Lawrence Seaway, and so forth.

We agree that the pages of the magazine should be open, keeping in mind, of course, the official policies as voted into being by the Board of Directors. If Engineer Dale would like to develop an article on the public power question, we would be most pleased to consider it for publication.—*Editor.*

More Mr. Smith . . .

Dear Editor:

I have just read the article by Mr. P. L. Smith in the December issue of the AMERICAN ENGINEER with a great deal of interest. This letter is not to answer Mr. Smith, for I do not advocate unlimited public power development, but I do feel that there is a place for such developments as T.V.A., Missouri Valley, etc.

Using T.V.A. as a point in discussion, such developments do far more than just provide power. T.V.A. provides river navigation, it conserves water, it fights soil erosion, and encourages and helps in reclamation projects. Private enterprise would not, even could not, have provided all of these benefits to the region which it serves. Certainly, private capital could not have developed a T.V.A. merely for peaking.

Now, I believe that Mr. Smith and the Private Corporations are justified in opposing steam generating plants by the Federal Government or its agencies such as T.V.A. There seems to be no justification for such developments. I believe, as an attorney, that our constitution does not contemplate the distribution of electric power by the Federal Government, the U.S. Supreme court notwithstanding.

I would suggest the age old solution, not original with me, but as old as the first T.V.A. debates, that is, the Federal Government be limited to incorporating hydroelectric plants in facilities designed primarily for water control, soil erosion, reclamation or navigational purposes. This

(*Continued on page* 41)

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American Engineer

FEBRUARY, 1953

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I venture to speak as an educator and point out that authoritarian systems have never in the past been noted for producing the type of men who could create or manage a dynamic society, the type of men who have made the modern industrial world. In short, I put my bet not only on the survival of the free world, but also—given time, patience and courage on our part—its triumph before the century is done.

—JAMES B. CONANT, *former Harvard President, and new U. S. High Commissioner for Germany.*

• SPECIAL ARTICLES

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The results of a year-long Executive Research Survey conducted by NSPE's Professional Engineers Conference Board for Industry. Part I of II parts.

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Tennessee's Fonde Case Is Decided In Favor of Engineers' Position

The celebrated *Fonde Case* in Tennessee (June, 1952, AMERICAN ENGINEER), raising the question of the proper line of demarcation between engineering and architectural practice has been decided in favor of the position of the engineers. As stated by Chancellor Thomas A. Shriver, "... it is the judgment of this Court that it cannot define and delineate the functions of architects and engineers in such way as to draw a line of demarcation between them which could be successfully applied in practice. This is emphasized in the record since it appears that the architects and engineers themselves could not agree on such a definition and division of functions."

The background of the case is that Fonde, a registered professional engineer in Tennessee, had engaged for a number of years in the design of structures, including residential buildings. He was challenged for this practice on the ground that he was engaging in architectural practice and not registered as an architect. A series of conferences between the members of the joint board and the state professional societies in the two fields failed to produce a settlement and Fonde filed the suit for a declaratory judgment to establish his right to continue his practice. The Tennessee Society of Professional Engineers and the Tennessee Chapter of the American Institute of Architects intervened in the case.

After reviewing the history and background of the Tennessee registration law, particularly noting that the Tennessee law covers both professions and is administered by a joint board composed of three professional engineers and three architects, he said, "it is likewise significant that as far as the statutory law in Tennessee is concerned architecture and engineering are not separated into two different fields, but are regulated by and under the same Board, and wherever they are referred to in the statute it is as 'architects or engineers' or 'architects and engineers'."

The Chancellor considered the definitions of the two professions found in standard dictionaries, the deposition of N. W. Dougherty, dean of engineering at the University of Tennessee, as well as Chairman of the Tennessee registration board and who was active in connection with the enactment of the law in 1921, the testimony of the chief design engineer of the Tennessee Valley Authority, and the deposition of the head of the TVA Division of Design, as well as a report of a joint committee representing the Tennessee Chapter, AIA, and TSPE which had been formed "in an effort to iron out the division of opinion between the professional members of

(*Continued on page 7*)

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Professional News in Capsule Form

Missouri Registration Board, Phone Company Reach Agreement • Starting Salaries for '52 Grads Reported • National Awards Made to Professional Engineers • CD Volunteer Corps Being Trained • Other Items of Interest

The Missouri State Board of Registration for Architects and Professional Engineers has concluded an agreement with the Southwestern Bell Telephone Company providing that the company will include in its application forms for listing in the classified columns of its directories a clause, "wherein the applicant will warrant to the telephone company that he is duly authorized to practice the profession named in his application."

Because members of the two professions must warrant that they are duly authorized to practice, unauthorized persons offering engineering or architectural services through the use of the phone directory's classified columns will be guilty of violating the false advertising law and subject, upon conviction, to fine or imprisonment, or both. The new application form will be used in a five-state area, including Arkansas, Kansas, Missouri, Oklahoma, and Texas, and in the jurisdiction of the Southwestern Bell Telephone Company in Illinois.

* * *

According to a recent announcement from New York University, the average starting salary for the school's 1952 engineering graduates was $328 per month, a 9 per cent increase over the 1951 average. The salary range included in the average was from $250 to $425. The statistics compiled in the survey also showed 73 per cent of the participating graduates in private industry, 7 per cent in civil service, 11 per cent studying full time for advanced degrees, and 9 per cent on active duty with the armed forces. There was an appreciable decrease in the civil service figure since the statistics for the 1951 class showed 16 per cent in the latter year.

* * *

Two professional engineers were among the "ten outstanding young men of 1952" selected by the United States Junior Chamber of Commerce. One, Frank N. Piasecki of Lansdowne, Pennsylvania, whose award was based on his leadership in the helicopter industry, is an NSPE member. The second engineer, Heinz Joseph Gerber of Hartford, Connecticut, received recognition for his invention of the Gerber Variable Scale. Engineer Piasecki will be the subject of a "profile" in next month's issue of the *American Engineer*.

* * *

Dr. H. E. Edgerton, whose inventions have made it possible to photograph a bullet in flight, has received the National Geographic Society's Franklin L. Burr Award. Dr. Edgerton is only incidentally a photographer as his actual profession is that of an electronics engineer, and he is currently a professor of electrical engineering at the Massachusetts Institute of Technology.

* * *

A volunteer corps of about 246,000 persons will be trained in the installation and operation of the engineering equipment now being stockpiled at 36 storage locations in the fringe of critical target areas for civil defense emergency use, according to a recent announcement made by the Federal Civil Defense Administration. The items being stockpiled include pipe units, pump units, water purification units, water chlorinators, engine driven electric generator sets, and plastic film window closure material.

Minimum engineering stockpile requirements for emergency repairs and restoration are determined by surveys being conducted throughout the United States in which many NSPE members are taking part.

* * *

NSPE member C. H. Weiser, a 46-year veteran with the Bell Telephone System, was recently elected president of the American Society of Safety Engineers. For the past two years, he has served as ASSE vice-president and as chairman of the Committee on Cooperation with other Engineering Societies.

* * *

Dr. Leonard Greenburg, the executive director of the Division of Industrial Hygiene and Safety Standards of the New York State Department of Labor, has been named as the first commissioner of New York City's new department of Air Pollution Control.

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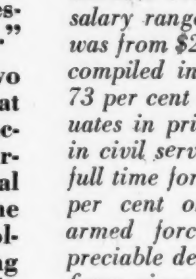

Earl E. Morton, Chief of Aerodynamics. Has had many years of experience in aircraft manufacturing and was responsible for engineering on many now famous aircraft.

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Who's Who in Engineering . . .

Seventh Edition of Engineers' Roster Is Being Prepared for Publication

Preparatory work on the seventh edition of *Who's Who in Engineering* is now going forward following a meeting between the Advisory Committee of the Engineers Joint Council and the editor and publisher to draw up minimum qualifications for inclusion in the volume.

The two categories of engineers agreed upon as eligible for listing are: (1) Engineers of at least ten years' active practice, at least five years of which have been passed in responsible charge of important engineering work; and (2) Teachers of engineering subjects in colleges or schools of accepted standing who have taught such subjects for at least ten years, at least five of which have been spent in responsible charge of a major engineering course in such college or school. Military assignments, it was also agreed, will have appropriate consideration in both of these groups.

The method of revision that will be followed includes the resubmission of their biographical material to all those engineers named in the sixth edition; the extension of invitations to supply data to a large list of eligible engineers who have been variously recommended for the volume since the appearance of the sixth edition; the extension of invitations to engineers in all branches of the profession not now included whose activities are indicative of the quality of their professional accomplishments; and the issuance of invitations to engineers recommended by institutions and organizations with which they have been identified.

Dr. A. A. Potter, Dean of Engineering at Purdue University and a member of NSPE, is chairman of the Advisory Committee, which also includes Paul H. Robbins, NSPE's Executive Director. Other members of the group are: George W. Bailey, Secretary, The Institute of Radio Engineers; Prof. A. B. Bronwell, Secretary, American Society for Engineering Education; Col. W. N. Carey, Secretary, American Society of Civil Engineers; Col. C. E. Davies, Secretary, The American Society of Mechanical Engineers; H. H. Henline, Secretary, American Institute of Electrical Engineers; S. Paul Johnston, Director, Institute of Aeronautical Sciences; E. H. Robie, Secretary, American Institute of Mining and Metallurgical Engineers; S. L. Tyler, Secretary, American Institute of Chemical Engineers; John A. C. Warner, Secretary, Society of Automotive Engineers; and L. Austin Wright, Secretary, Engineering Institute of Canada.

NSPE Executive Comm. Meets In Washington

The Executive Committee of NSPE met in the Executive Offices of the Society in Washington, D. C., on January 11, 1953. New and old business was reviewed with special attention being given to the continuation of the public relations program, legislation to be taken up with the new congress, and consideration of an invitation from the Engineers' Joint Council for the Society to join that group.

The second report written on "How to Improve the Utilization of Engineering Manpower," and published by the Society's Professional Engineers Conference Board for Industry in book form (see page 18) was discussed. The report has been given outstanding publicity in the nation's press, and this development was thoroughly reviewed by the Society officials. Also discussed was the possibility of a third report to be issued at a later date, and consideration was likewise given to holding a conference of industrial leaders to review the findings of the utilization survey.

The Executive Committee studied the actions that NSPE might take when the Senate and House Labor Committees hold hearings on certain phases of the Taft-Hartley Act. It was decided that the society should present testimony supporting the present professional provisions of the Act.

There was a general discussion of an invitation from Engineers' Joint Council to the NSPE to join that group of engineering societies. It was agreed that because the Board of Directors had not had an opportunity to review the invitation, that an official reply could not be made at this time. The Society will, however, avail itself of EJC's invitation to send observers to coming meetings. Subsequent to the meeting President Coleman appointed Vice President Clarence Shoch and National Director Robert Allen as the NSPE observers.

Other items of interest discussed by the officers were Engineers' Week, *American Engineer* editorial and advertising policies, and salary and fee studies.

Fonde Case

(*Continued from page* 5)

the Board." Upon the basis of this review the Chancellor concluded, ". . . it appears as a fact that cannot be seriously questioned that the functions of these two professions, viz., architecture and engineering, so overlap that there is no practical way to draw a clear line of demarcation between the two.

"As applied to the field of building construction, it seems perfectly clear from the proof and the record as a whole, as well as from facts of which the Court might take judicial knowledge, that an architect, in order to successfully pursue his profession, must be trained in certain branches of engineering, while, on the other hand, an engineer trained in the field of construction, might be able to design many types of buildings and many of the components of various buildings with as much scientific skill as an architect, even though the engineer might not be trained in the art of making buildings artistically beautiful."

The architects relied mainly on the *Rogers* case decided in 1934 holding that the individual had violated the law by engaging in the practice of architecture without being licensed. The Chancellor distinguished this holding, however, pointing out that Rogers was not licensed as an architect or a professional engineer and ". . . it may be that Rogers could have been prosecuted for practicing engineering if the Board had chosen to charge him with such practice." The Court also noted the *Standard Engineering Company Case* of 1928 in which it was stated that "plans for all work must be drawn by registered architects and engineers." The Chancellor commented that this language was ". . . a recognition by the Supreme Court of the overlapping and the statutory 'lumping together' of these professions for purposes of regulation."

The court concluded that it must, therefore, deny the request for a declaratory judgment defining and delineating the practice of architects and engineers and directed the entry of a decree in favor of Fonde eliminating the threat of prosecution against him for his practice.

The decision is subject to appeal to the State Supreme Court.

What Do We Want from Our Monthly Magazine?

As we expand the AMERICAN ENGINEER to a 42-page publication, the above question is one justifying a moment to consider. It is a question which has a diversity of opinion among the membership of NSPE. A survey of the membership indicates there are three basic items which members of the Society wish to find in their publication. As a result, the policy of the Society now is to provide these three elements in the magazine in about equal portions.

Knowing that most members are interested in aspects of engineering which have a particular slant on the development of the profession, each issue of the magazine carries several professional articles in which outstanding leaders of the nation discuss an aspect of engineering in which they are interested and informed. But the magazine should also provide a medium whereby the members of the profession can both secure professional information and express their own opinions on matters of concern to their fellow engineers. These pages are also provided, via the special features section, Professional Postscripts, capsule form news stories, and similar items. And since we are one big community of professional interest, and what is going on in various chapters and state societies is of interest to other chapters and state societies, a section devoted to "around the nation with our members."

A question frequently asked, and one in which there is even more interest in light of the Board of Directors' recent decision to expand the AMERICAN ENGINEER, is an interest in the past history of the AMERICAN ENGINEER. Some of the old-timers in NSPE will recall that the AMERICAN ENGINEER actually is older than the Society, for it was published for four years by the New York State Society of Professional Engineers prior to the formation of NSPE. At the time of the formation of the National Society, the New York State Society gave the magazine to the national organization, and Dr. Arthur Sheridan, the second President of the Society, became its editor.

The Society's budget at that time was extremely limited, and the officers were faced with the problem of maintaining a monthly publication with barely enough funds to provide for its printing. The Society entered into a contract with a New York publisher for the complete production of the magazine. This arrangement turned out to be an unsatisfactory one for the Society, for difficulties of production and mailing developed and the advertising solicitation not only failed to produce revenue, but actually antagonized certain sections of the advertising field. The Society obviously had to make other arrangements and the time between 1946 and the present has been spent largely in improving the magazine from this low point.

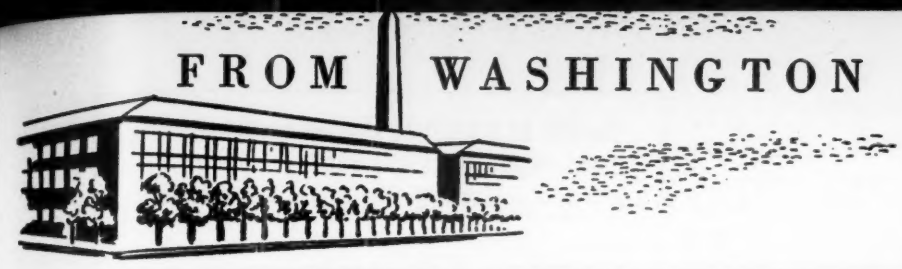
THE first step was to secure a part-time editor; then a full time man on the Washington staff whose duties not only included editing the magazine, but other public relations activities. As rapidly as possible, the layout or physical appearance of the magazine was improved and then great effort was devoted to improving the editorial and content. Thus it has been only within the past year or year-and-a-half that Society officials have felt it possible to market the publication as an advertising medium.

Advertising promotional efforts were expanded during this period of time, but, again, with unfortunate consequences. For a time the Publications Committee, all busy men scattered throughout the country, endeavored to secure advertising. Some moderate success resulted, but it was soon apparent that a more concentrated effort was necessary. During one period an advertising solicitor was employed on a part-time basis, and when this did not work satisfactorily, advertising representatives were secured on a commission basis.

Within the past year, however, arrangements have been completed with an aggressive working organization in New York City which is now actively promoting advertising on behalf of the AMERICAN ENGINEER. Already inquiries indicate that improvements in this side of the picture can be expected in the future. However, authorities in the advertising field indicate improvements will be slow and will take several years to be successful.

IN the meantime it must be recognized that to improve the magazine continuously means that such advertising revenue as may be secured should be put into the magazine to make it an even more attractive advertising medium. Experience with other publications in the professional field indicates it is probable that a good professional publication always will require some financial support from the dues income of the membership. Under the present circumstances, the AMERICAN ENGINEER is operating within the income provided by the $2.00 subscription rate which is a part of each member's dues, the paid subscriptions from non-members, and the advertising revenue.

The new policy adopted by the Board of Directors at Richmond provides for an expansion of efforts to improve the magazine. As will be noted with this issue, an additional eight pages have been added to the size of the magazine; the ultimate objective will be to permit the editor to devote his full time to the publication, and an Advertising-Business Manager is to be added to the staff for the purpose of giving the necessary time to the securing of reader information, taking of surveys, and other activities necessary for effective advertising promotion.



FROM WASHINGTON

By
Milton F. Lunch,
N.S.P.E.'s Legislative Analyst

Where do we go from here in our national defense program? That question in one form or another is occupying the thought of many national leaders, including most particularly President Eisenhower, proposed Secretary of Defense Wilson, and the other key officials of the incoming Administration. Upon the answer depends the fate of most of the other national programs of the years which lie ahead. This fact becomes crystal clear when it is realized that the budget for 1953-54 recently submitted by Truman calls for an expenditure of $78.6 billion of which almost 60% is for military services, not to mention another ten per cent for international aid programs keyed in with the direct defense expenditures. It is confidently expected that the new administration and the new Congress will reduce the suggested amounts but even the new President's Budget Director has warned the public not to expect "miracles."

Much of the enormous defense expenditure since Korea and a good part of projected future expense is directly attributable to the necessity for rebuilding the war production facilities of the nation, retooling, new plants, and the myriad of other facilities which make up the national war production machine. Under a policy of scrapping or permitting facilities to become obsolete when their immediate use has passed for the time being it has always been necessary in time of new emergency or danger to start from scratch or close to it. This policy of "feast and famine" is now under serious scrutiny and a far-reaching proposal has been made to change our thinking on the subject which is of more than casual interest to the engineering profession.

In his final report to Truman, Henry H. Fowler, Director of the Office of Defense Mobilization, points out that in past wars in which the United States has engaged a great part of the job of making ready for full-scale war production has been accomplished after the war began. "Our ability to throw our great industrial strength into the scales of war quickly and efficiently is, on the one hand, a major deterrent to war and hence one of the greatest factors for peace. On the other hand, if it fails as a deterrent, it can assure us victory in the shortest time with the least loss of life." Accordingly, it is recommended that the nation proceed to make our complex industrial system ready in all important respects for wartime needs.

Backing up this major thesis of the ODM report is a recently-issued six-month study of the Special Advisory Committee on Production Equipment composed of leading industrial executives. This high-level group studied the basic problem of determining the best method of filling the gap between existing production capacities and those which would be needed to meet end-item requirements in the event of full mobilization.

Since Korea, the report states, highest priority has been placed on meeting current military needs. But, it adds, with forces-in-being and weapons production now brought up to substantial levels, emphasis should be shifted to completing the production capacity needed as a base for full mobilization.

Such a shift is necessary, the report said, because the outbreak of a new war probably will not allow the Nation the necessary period of time—such as it enjoyed in the first and second world wars—to expand its production equipment industries and tool up its military production plants. The Committee said it was convinced that "capacity to produce is, in fact, a military reserve of the highest order," and proposed that production capacity be substituted for the stockpiling of military end-items to the greatest extent practicable.

"Maximum security," the Committee stated, "can be achieved with maximum economy by maintaining munitions production plants in a high degree of readiness, capable of rapid expansion of output in event of war, and relying upon such readiness as a partial substitute for stockpiling of reserves of munitions."

(Continued on page 10)

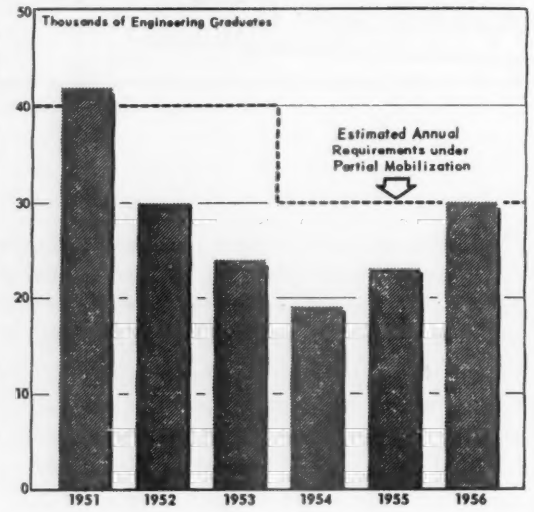
From Washington

(From page 9)

Enlarging on this proposed policy, designed, it was said, to attain military preparedness with maximum economy and a minimum drain on resources, the Committee declared that the initial cost of facilities is small compared to the cost of producing end-items for the mobilization reserve.

"For example, in the case of certain ammunition components, the cost of facilities is equivalent to the cost of full production for only about six weeks. Moreover, most facilities are not subject to 100 per cent obsolescence at any time, as are end-items, and the cost of modernizing facilities to produce improved end-items is only a fraction of the expense of modernizing stockpiles of end-items by scrapping and replacing obsolete models. In many cases the recovery and reuse of materials from obsolete end-items is more costly than the original cost of the materials."

Number of graduating engineers will not meet requirements until 1956



On the subject of cost, the Committee declared that end-items are more seriously affected by obsolescence than are the facilities that produce them. As an illustration, when an inventory of 5,000 tanks becomes totally obsolete, it means a loss of at least $1 billion, but the cost of keeping the tank plant facilities up to date would be a small fraction of that amount.

It was recommended that the government should take every means at its disposal where deficiencies exist in capacity to produce heavy production equipment to stimulate creation of the needed capacity by private industry, and if these efforts fail because the capacity needed is found to be commercially nonsupportable, the government itself should create and maintain this capacity.

The presidential budget message asks for a small start on a program of this type, calling for $500 million as a base fund to overcome deficiencies in capacity required to swing rapidly into full-scale production of the military items needed in wartime. The fund would be used for the Department of Defense to purchase the plants, tools, and productive facilities that would be needed, and $100 million would be used to acquire facilities which when no longer needed for the present purposes would be converted to civilian production or otherwise disappear from the mobilization base.

The Fowler report takes note of the engineering manpower problem and states that "acute shortages are continuing among highly skilled professional, scientific and technical workers needed in defense and essential civilian activities. Under full mobilization, the lack of such workers would be critical.

"Supplies of engineers—aeronautical, electrical, mechanical, sanitation, as well as other types—are far short of requirements. Research, development, and production of new types and models of military items are being affected."

As indicated in the chart on this page, the ODM report estimates that the number of engineer graduates will not meet requirements until 1956 when the number will reach 30,000 per year.

On another facet of the manpower situation—perhaps more pertinent from a practical standpoint than the supply situation—is the comment in the ODM report that considerable progress has been made in developing subprofessional personnel to free professional workers from simple and routine duties. "Improved techniques must be worked out to insure that scientists, engineers, and other specialized personnel would be used effectively in a period of full mobilization." This suggestion had previously merited the attention of NSPE and the Professional Engineers Conference Board for Industry who had studied the utilization problem in detail and published a comprehensive report, "How to Improve the Utilization of Engineering Manpower."

A strong plea is contained in the report for the nation to maintain its lead in technological research. The retiring ODM Director states: "I believe it is probable that the technical superiority of our country, particularly in the field of atomic weapons, has been the decisive factor that has deterred the Soviet Union in the past few years from attempting aggression on a scale that might result in global war.

"If this country should ever permit the military technology of the communist world to get ahead of our own, even if only in a limited range of offensive or defensive weapons, then we would be in imminent peril of world-wide communist attack."

—Part One of Two Parts—

EXECUTIVE RESEARCH SURVEY

NUMBER TWO

How to Improve the Utilization of Engineering Manpower

Prepared Under the Direction of

THE PROFESSIONAL ENGINEERS CONFERENCE BOARD FOR INDUSTRY

about this report

THIS report is a summary of the second of a series of Executive Research Surveys begun in 1951 by the National Society of Professional Engineers, through its Professional Engineers Conference Board for Industry. It pools the experience of more than 495 companies employing engineers, on the subject of "How to Improve the Utilization of Engineering Manpower."

The purpose of the research program is to assemble and publish current information on engineering-management relations for the benefit of industrial employers of engineers and the engineering profession.

The topics which are being studied were selected by some 100 major industrial employers of engineers. During a preliminary study, these employers were asked to select from a list of management problems those topics on which they would like to have data derived from the experience of many companies.

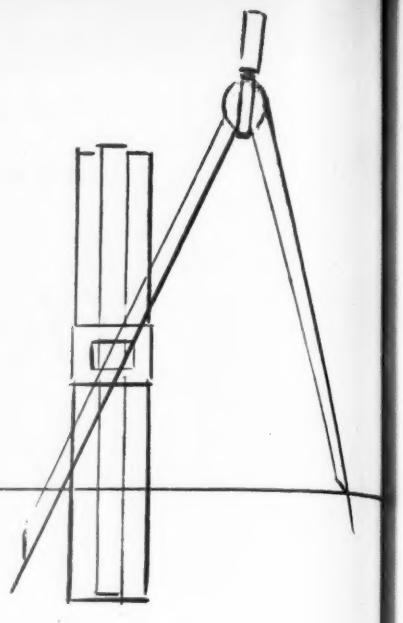
THEY SELECTED FOUR TOPICS

I. How to Improve Engineering-Management Communications
II. How to Improve the Utilization of Engineering Manpower
III. How to Attract Qualified Engineers
IV. How to Train Engineers in Industry

The Professional Engineers Conference Board for Industry was formed to guide the research program instituted to get the answers to these topics. Composed of leading industrial executives, the Board is an advisory group which works closely with Society officials at all stages in the development of research surveys and reports.

Editor's Note: Asterisks throughout the text indicate deleted portions from the original report.

> **"It is the engineer's responsibility to take the new research discoveries as they come along and to put them to work for the benefit of man, and to find ways of doing it that industry and the people can afford."**
>
> ***Harry A. Winne, Vice President—Engineering***
> ***General Electric Company***



Introduction

ENGINEERS create new industries and make new processes, products and facilities available to business, industry and the public. Their close linkage to the country's economy makes the demand for their services sensitive to economic trends.

However, engineers have become such a vital factor in industry and business that it does not seem likely that the United States will have a surplus of engineers for creative engineering and management work.

Therefore, industry's problem is to make the most effective utilization of its engineering manpower.

This study is designed to help industry use its engineers most effectively. It is based upon the results of a survey of more than 495 major industrial companies and engineering firms. The methods and procedures which they found helpful in using their engineering staffs with maximum efficiency and results point the way for other companies which have the same problem.

Obviously, the more complex problems and procedures of a multi-plant corporation with a shortage of more than a thousand engineers are not the same as those of a small manufacturer that needs but three. However, the principles of utilization are universal. One can learn from the other. The individual human being, who is an engineering specialist, is the common denominator.

Most managements recognize the need for improving their utilization of engineering staffs. However, in some companies, graduate engineers are still being used on relatively unimportant jobs which could be performed by non-engineers.

In companies where engineering is a major part of their operations, the engineers' versatile talents and excellent ability have made them top prospects for executive positions. They are often assigned as administrative executives or placed in sales engineering, customer and industrial relations posts.

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THE NEED FOR ENGINEERS

The need for more engineering man-hours in industry and civilian life extends to almost every field, for engineering is everywhere—transportation, communication, security, food and clothing and in improving man's health and environment—now and in the future.

Engineers are responsible for many of the developments which are accepted as commonplace today but were unheard of, and often unthought of, twenty-five years ago.

Obviously, the accelerated defense effort and the draft and reserve requirements of the armed forces have contributed most to the upsurge in engineering manpower requirements.

The increase in engineering man-hour requirements is graphically illustrated by this example from the aircraft manufacturing industry.

It takes three times as many engineers to draft plans for airplanes as it did ten years ago.

A jet plane requires ten times the engineering manpower necessary to build a conventional airplane.

The first new B-47 bomber, the most colossal aircraft ever to dominate the skies, required 3,464,000 engineering man-hours.

In comparison, the first B-17 required 85,000 engineering man-hours.

(*Charles E. Wilson, former Defense Mobilizer, in 1951 fourth quarterly report to President Truman.*)

These vivid examples demonstrate the effect which the country's industrial and economic development has had upon the need for additional engineering manpower.

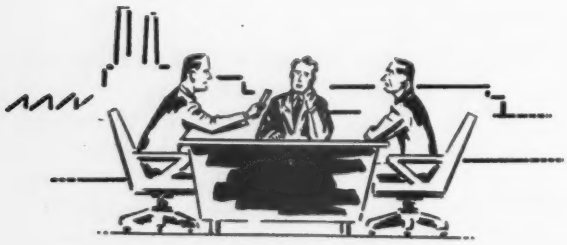
Engineering demand is greater not only in heavy industry but also in industries supplying products directly to the consumer. For example, the public today demands

more fruits and vegetables in its diet. Twenty years ago the demand was for grains and starches. Refrigeration and advances in food processing and shipping have made this change possible. Now fresh fruits and vegetables are available the year round.

STUDY GIVES "HOW TO"

This study is designed to give the "how to" of easing the demand through better engineering staff utilization. It is the second of a series of studies of engineering-management problems sponsored by the National Society of Professional Engineers. The first study was concerned with improving communications between management and engineers. Results of that survey were published in a report called, "How to Improve Engineering-Management Communications."

The scope of the survey on utilization was nationwide. It was conducted by means of questionnaires, personal inquiry, research and consultation. Questionnaires designed to obtain information from management and engineering heads were prepared with the counsel and advice of leading industrial executives. The study was conducted in such a manner as to obtain a fair picture of the nature and extent of the demand for engineering manpower and the methods which a representative segment of industry is using to meet the problems which this demand creates.



who were surveyed . . . and what they do

Who replied?

- More than 495 companies
- They employ more than 2,750,000 people
- They have 3,948 plants
- They are engaged chiefly in manufacturing, but utilities, contractors and builders, and service engineering concerns were represented in about their proper proportion

How many engineers do they employ?

- More than 106,000
- Approximately 85 per cent of these engineers spend three-quarters of their time in technical engineering work
- Their potential for increased responsibility is generally rated "good" or higher

How many engineers do they need?

- On September 1, 1952, they needed about 11,000 more engineers
- If *these* needs are met, they will need *another* 8,000 engineers between September 1, 1952, and March 1, 1953
- They expect these figures will increase because competition for engineering talent, and other factors, have increased turnover

MORE THAN 495 companies located in all parts of the country and representing a cross-section of American industry replied to this survey. Top managements were asked a series of questions as to activity and size. This is a summary of the questions and their replies:

Q. What does your company do?

A. The industries represented include steel, chemicals, petroleum, aircraft and heavy manufacturing, utility and construction companies and other industrial firms. Also included were engineering firms engaged in consulting, research and design. The largest employers of engineers—the manufacturing companies—accounted for about 60 per cent of the replies.

Q. How many plants does your company operate?

A. Plants covered by the replies totaled almost 4,000; of these, about 3,500 were classified as major plant locations.

Q. How many people are employed by your company?

A. Employees numbered 2,776,510. One respondent

employs nine people; the largest company responding employs more than 200,000.

Q. How many engineers do you employ and how many of them spend at least 75 per cent of their time in technical engineering work?

A. More than 106,000 engineers are employed by the participating companies and 85 per cent of them spend more than three-quarters of their time in technical engineering work. Employment by companies ranged from four to as many as 12,000 engineers.

Q. Do you use supporting personnel to do subordinate engineering work for your staff?

A. Most of the companies—70 per cent—said that they used supporting personnel to relieve their staffs of routine engineering detail.

Q. Do you employ graduate engineers on other than strictly engineering work? If so, what are they doing?

A. Approximately 70 per cent of the companies stated that they did use graduate engineers for non-technical work. These engineers are doing the following work: Sales, Customer Relations, Industrial Relations, Executive Duties (outside engineering department), Other (advertising, patent work). Some pointed out that graduate engineers fill top management non-engineering assignments.

CHAPTER I

indoctrinating engineers . . . suggestions for programs

CHAPTER SUMMARY

Analysis of indoctrination programs
- Many companies have no indoctrination programs
- Communications structure should be checked
- Good programs result in better efficiency and production

Importance of careful selection and training
- Help eliminate misfits
- Improve work of new engineers
- Use of psychological tests in selection

Work indoctrination programs
- The short program
- The long program

The orientation checklist
- General orientation
- Organization
- Work assignment

IN THE NSPE survey, "How to Improve Engineering-Management Communications,"* it was found that 56 per cent of the firms covered had no formal training program for newly-hired recent engineering graduates. Sixty-six per cent of the companies had no distinct indoctrination program designed specifically for newly-hired *experienced* engineers.

Results of the second survey show that since the issuance of the first report, improvement in engineering-management communications has been shown in some companies. However, the extent to which they have been improved in the majority of those which showed a poor communications structure is unknown.

* Published March, 1952.

POOR COMMUNICATIONS MEAN POOR UTILIZATION

Lack of good communications between management and engineers is reported as one of the major factors resulting in the poor utilization of engineers. Indoctrination programs have a very important part in the orientation of the engineer to the company, and the vital role which he is to play in its work. Where organized programs do exist, they are used broadly for management communications. Thus, they perform the double function of telling the engineer about the company, its policies and his future with it as well as thoroughly orienting him on methods and procedures which he is to use in his work. He is therefore better able to produce at peak efficiency.

Evidence of the value of well-developed indoctrination programs is disclosed in the replies of several companies which participated in both surveys. Since the publication of the study on improving engineering-management communications, these companies have instituted indoctrination programs as part of their effort to improve their communications structure. They report that these programs have made new employees not only *more efficient but also more effective.*

EXAMINE COMMUNICATIONS STRUCTURE

The first step in analyzing methods to employ engineers at the fullest of their talent and capacity undoubtedly should be a thorough examination of communications between management and engineers. More detailed information on this subject is contained in the NSPE booklet, "How to Improve Engineering-Management Communications." This subject is fully developed in the report which is available from NSPE. Communications is an important part of any indoctrination program. The various types of indoctrination programs in existence in the companies surveyed are reviewed briefly here. Needless to say, such a program should be tailored to suit the individual requirements of each company.

TRAINING IS IMPORTANT

Several sources comment that the philosophy of some companies today is "get 'em first—then see if they're alive." However, most companies state that even today,

selection is a key adjunct to training. They emphasize that good men require special training in order to reach, quickly, their own level, direction and pace of work. Lesser candidates, in whom an investment is to be made, will pay off more quickly if the trainers know their strengths and weaknesses, and can develop in them the proper capabilities.

Another factor considered is that training programs make it possible to eliminate misfits from the company before they can become a major item of expense and failure.

One of the responding companies reported that it seeks to minimize turnover in its training program by careful selection of qualified men. Other companies give their new employees extensive psychological tests and report very effective results in selection of new engineering people.

WORK INDOCTRINATION

Work indoctrination programs are divided roughly into two classes, according to whether they are for recent graduates or experienced engineers. Obviously, the experienced engineer will require a shorter, more specialized program. He can take more, faster. Generally, he is anxious to get to work.

THE SHORT PROGRAM

The short type of program is designed to brief the engineer on working procedures and production methods. He is then ready to go ahead on his own. An example of this is the three-weeks-long, intensive, full-time familiarization course used by a major aircraft manufacturer. It is reported that this course enables engineers to pick up production work quickly. The newly-employed engineers take less of the supervisors' time for instruction.

In another company, new engineers learn production methods and procedures at first hand by working in the shops.

THE LONG PROGRAM

The longer programs are customary in such industries as electric utilities, communications, chemical and electrical manufacturing. Junior engineers in these fields usually receive a two-year course designed to provide them with a thorough knowledge of the company's engineering practices.

In order to make engineers available earlier, one public utility company has cut its training program from 24 months to 17 months. Although the program is stepped up, the quality of the training is kept at a high level.

Another example of the longer type of indoctrination program is that of an electric motor manufacturing company which trains young engineers on the drawing board for one or two years. The company reports that they learn faster on the board and, in many cases, they replace a more experienced engineer with satisfaction on the part of both company and the individuals.

Typical of the comments from companies which have indoctrination programs or which have instituted them recently, is that of a large chemical company. It stated that its orientation program for young engineers had made them more effective during their *first* year of employment, as well as from the long-range point of view.

The chemical company's program which appears on pages 16, 17 and 18 (*of the original report*) is divided into three parts: general, organization and work assignment. Time periods specified are: first week, first month, three months, six months and one year.

The first week and month are developed in considerable detail and the other periods concentrate increasingly upon responsibilities and more technical engineering subject matter.

In the first week, the new engineer is given full information on company policies and services, he is introduced to his group members and other personnel; and the engineering division's organization and its place in the company are explained to him. Also, he makes plant trips, the plant manufacturing process is explained to him, he is given complete orientation about his first job and assigned to it.

The first month, he receives additional information about company personnel policies, the value of outside studies is emphasized, the research and other laboratories' organization and functions are explained to him and his knowledge of plant and area processes is checked.

There is an informal discussion of his progress every two or three months and his individual program development is reviewed.

The detail of this program is more extensive than that of many companies. However, it shows the planning which goes into orienting the new engineer to the company, his job and his future.

The most important fact underscored in the survey is that *sound indoctrination programs for engineers increase the effectiveness of engineering manpower.*

* * *

CHAPTER II

making the existing engineering staff more effective

CHAPTER SUMMARY

Organization

- Centralization of top-level engineering
- Decentralization of ground-level engineering

The engineering planning group

- Detail estimating, scheduling and budget control for project engineer
- Planning personnel assigned to specific projects
- Organization plan

Supervisory training for engineers

- Training in supervisory practices and human relations
- Use of industrial psychology
- Psychological tests for personnel selection

Planning methods should be reviewed

- Better original planning necessary
- Cooperation with sales and operations departments important
- Project planning should be analyzed

A checklist of suggestions

ORGANIZATION

MANY of the replies to the survey indicate that companies are studying their engineering departments to determine what changes or improvement in organization will make the existing engineering staff more effective.

There are additional suggestions for the improvement of internal organization contained in the completed survey questionnaires as well as in the comments of other authorities consulted.

It is suggested by the survey replies that the companies analyze their engineering departments to effect *centralization of top-level engineering*. The ground-level work can then be decentralized into district or department areas with comprehensive standard practices and specifications. Also, it may be possible to consolidate engineering departments through such centralization. This cuts administrative and clerical costs, boosts efficiency and work output.

Clear-cut delegation of authority and responsibility is rated as absolutely necessary. Thus, the engineers know exactly what their responsibilities are and to whom they are accountable.

One company reports that it has increased the effectiveness of its engineering personnel by decreasing the number of engineers per senior engineering supervisor by one-half. Closer supervision brings better results, the company says.

In order to equate the engineering workload, a large jet engine manufacturer has set up an engineering planning group to take over estimating, scheduling and budget control on engineering projects. This takes the burden from the individual engineers and saves their time for *more* technical work.

The engineering planning group is set up to take over detail estimating, scheduling and budget control activities for the project engineer. Although this is a central group, individuals within that group are assigned to specific projects and are located physically with the project group.

This is designed to provide the project engineer with the services of an administrative assistant for estimating, scheduling and budget control activities on his project and at the same time maintain common procedures and methods of carrying out these activities by retaining supervision of such personnel through one department.

The project engineer retains authority for his project but gains a thorough knowledge of his schedule and budget situation. This information is readily available and is brought to the engineer's attention usually together with a recommendation when corrective action seems to be warranted.

Through assignment of specific planning personnel to specific projects the non-technical planning personnel rapidly becomes efficiently familiar with the overall aspects of the project. Thus they are able to relieve engineers of the routine work of preparing status reports, progress reports and material for review and discussion with the customer.

The planning group, as such, reports to a planning engineer who, in turn, reports to the manager of engineering. There are also some direct contacts between the manager of engineering and the planning group for information or suggestions for correcting unbalances of schedules or budgets. Where the project does not warrant the services of a full time planner, one planner may serve as many as three small projects which are physically located to make this convenient.

Personnel in the planning group are made up of some college graduates in arts, industrial engineering and accounting and non-college graduates with experience in production control or minor administrative assignments. Although there is no set standard with respect to education or experience, the personnel usually have some related experience.

TRAINING ENGINEERS FOR SUPERVISION

It has been shown that supervisory engineers can obtain better results if *they* are trained in job methods, supervisory relations and techniques, and conference leadership. By these means, they grow to understand how to get the most from the people working for them, how to organize, and the most efficient methods for getting the work done. Conference leadership training is a management tool of great value in "drawing out" and developing engineers for further management responsibility.

In line with the recommendations concerning the training of engineers on understanding of people they work with, it is reported advisable that they have some training in human relations. The engineering schools are giving some training in this field. It assumes additional importance in times when the efficient functioning of supporting personnel eases the engineering workload.

A clearer knowledge of the reasons behind people's actions and reactions enables the supervisor to handle his subordinates with the personal touch which brings forth their best efforts. All too often, as several good authorities on engineers and industrial psychology point out, the engineer sets himself apart. This attitude does not engender enthusiastic work or efficient production by his fellow employees.

The use of industrial psychology, particularly psychological testing, is reported by a good number of the survey participants. These tests have proved valuable in the selection of engineers who are best suited to supervisory work. They also aid in determining the fields of activity in which the engineers will be most effective.

The companies indicate that results of the psychological tests help to channel those engineers not suited for supervisory work into other activities, such as pure research, where they can work with a minimum number of assistants. Often they can make very valuable contributions if they are properly placed and encouraged.

If you work for someone and want to make yourself more valuable ... or if you are an employer who needs engineers

you'll want this book!

LOOK AT THESE CHAPTER TITLES:

CHAPTER I	Indoctrinating engineers—Suggestions for programs
CHAPTER II	Making the existing engineering staff more effective
CHAPTER III	The use of supporting personnel
CHAPTER IV	Are engineers' talents being wasted?
CHAPTER V	Auxiliary sources of engineering talent
CHAPTER VI	Engineering turnover—Causes and results
CHAPTER VII	Preparing the engineers of the future
CHAPTER VIII	How to improve the utilization of engineering manpower —Summary and recommendations

Suggested Readings on Utilization

WOULD you like to know how 500 of America's leading industrial firms are solving their engineer shortage problems? Whether you are employer or employee you can't fail to learn much from this NEW book about a problem that has concerned the Nation's leading industrial minds. *How to Improve the Utilization of Engineering Manpower* is a 56-page study of industrial firms and engineering organizations employing some 106,000 engineers and a total of 2,750,000 persons. It is the second in a series of Research Reports based on Executive Research Surveys conducted by the National Society of Professional Engineers through its Professional Engineers Conference Board for Industry. The first report was entitled, *How to Improve Engineering-Management Communications.*

How to Improve the Utilization of Engineering Manpower is a guide book and manual for the executive in companies and organizations employing engineers and engineering services. For the engineer ... the student engineer ... the engineering educator, it is an appraisal and textbook of the values of better utilization.

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It is reported by the survey participants that effective engineering placement is made much easier when the individual's mental and physical capabilities are clearly known and reckoned with. A truer, more comprehensive evaluation of the engineer's work and his advancement potential can be obtained through well-directed psychological testing.

It is not within the scope of this report to recommend or analyze the psychological tests. Their use should be considered by companies which do not presently use them. A new evaluation for their greater effectiveness should be made by companies which have them.

PLANNING

Better original planning of work to be done may seem a restatement of an obvious requirement but a number of companies replied that this fundamental undoubtedly made engineering staffs more efficient. They urge that work planning should be more carefully studied to assure that it is comprehensible and well-considered in the eyes of those who are to be assigned.

Survey replies suggest that engineering work programs should be scheduled in close cooperation with sales and operations departments for certainty that they are efficiently planned, timed and executed. Weekly reports on work done and completions on schedule are helpful guideposts in keeping work programs efficient. Close control should be exercised over "task loading." The workload should be reviewed at frequent intervals to remove "dead issues" and keep it current. Assignment of problems should be made as selective as possible and the engineers' work should be closely coordinated.

If projects are planned carefully, there is a minimum of waste time and motion. It is apparent from the survey replies that an analysis of project planning has resulted in improved project results.

To speed its plans, one company has its key staff prepare the preliminary design, sketches and master design. Subordinate personnel then prepare the final plans.

There are several other useful suggestions for increasing efficient planning. More detailed project information, priority ratings for projects, careful specification of objectives, and closer supervision all help engineers to perform their work with maximum results. More direct line cooperation and assistants with practical "know-how" are also helpful.

Several companies make it a policy to set up project engineers who carry a project through all phases of engineering and production. These men are usually responsible for the project through the test sample or pilot run stage. Supporting personnel, with limited responsibility, are assigned as assistants to the project engineers. The assistants may be under several project engineers *if their work serves a general purpose* for several projects.

In companies which manufacture a number of different products, the project engineer is often shifted to another type of project or another product in order to give him a well-rounded picture of the company and its operations.

Moving the engineering department to a larger, quieter location contributed greatly to the improvement of engineers' efficiency at a large glass manufacturing plant. Formerly, the plant engineering department and the office of the master mechanic were located on the first floor of the main office building. As it increased in size, the plant engineering department was moved to separate, larger quarters on the fourth floor.

This move saved valuable engineering man-hours by eliminating traffic, increased the use of telephone contacts and eliminated much of the traffic due to personal contacts and the business of the master mechanic's office.

Further, the new quarters made possible a better layout for the department and more space for the individual, thus increasing efficiency.

ADDITIONAL SUGGESTIONS

Some suggestions which seem to have broad application and usefulness are included in the following list with the expectation that they may stimulate resultful thinking:

Relinquish what was formerly thought "engineers' work" to intelligent women engineering clerks.

Increase use of standard engineering practices to eliminate details and permit draftsmen to do some of this routine work.

Solicit and encourage ideas of rank and file through conference.

Allow younger engineers to participate in conferences affecting basic technical decisions; give them responsibilities as soon as they are ready.

* * * * *

Paid time off for attendance at special courses and symposia.

Use prototype drawings to reduce number of detail drawings; remove bills of material from drawings where possible to make them separately reproducible for general purposes; perform only layout and general arrangement drawings—detailing can often be constructed.

Compromise with perfection where something nearly as good will do the job almost as well at less cost in time and effort.

Improve working conditions—quiet location, modern equipment and lighting, engineers at desks, etc.

Use punch cards and similar aids to obtain engineering data more easily.

CONCLUSIONS

Centralization of top-level engineering and clear-cut delegation of authority and responsibility make engineers more effective.

Training in human relations and supervisory techniques enables the engineer to direct the work of subprofessional personnel more effectively. It also helps him to obtain the employees' best efforts.

Industrial psychology has been found a valuable management tool in selecting engineers and evaluating their potential.

Better original planning of work to be done is a fundamental factor which a number of companies found resulted in better utilization of engineering manpower. Projects should be planned to insure a minimum of waste time and motion.

Engineers should be left free to use their professional talent and creative ability for *technical* work.

CHAPTER III

the use of supporting personnel

CHAPTER SUMMARY

How to make engineers' work more effective

- Supporting personnel can be assigned routine engineering duties
- Jobs should be standardized and simplified
- Engineers can do more creative work
- Engineering staff should help build supporting personnel's effectiveness

Careers as technical aids

- Training separate from engineering training program
- Recruit from technical institutes
- Some companies train their own
- Use of engineering students who don't graduate

Checklist of engineering duties which can be assigned to personnel

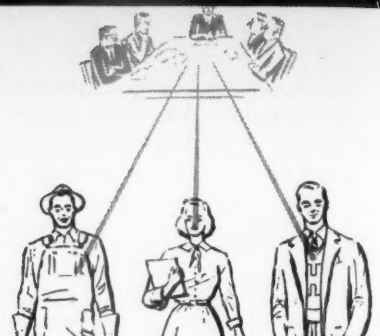
THE USE of supporting personnel to relieve engineers of routine duties is reported as one of the most productive methods of obtaining the fullest utilization of engineering manpower.

One of the survey replies stated that the use of supporting personnel is resultful for "it stimulates them (the engineers) to continue their potentialities and to do the best job with the skills they possess at their present stage. It helps them to develop faster. They seem to lose perspective and morale when kept in jobs which obviously could be done by people with less training."

Another reply stated that: "The engineers are relieved of the burden of routine paper work and checking of standard procedures and practices. Engineers feel that they are performing more useful work and can devote more time to new developments and research to enhance their background and experience. They put twice as much effort into their work."

These two comments are indicative of the responses received from many of the companies which participated in the survey. Their careful analysis of the work which engineers are performing often reveals that many of these jobs could be standardized or simplified so that they could be done by supporting personnel. The engineer is then left free for technical engineering work and creative efforts to develop ideas. He can keep associated personnel busy translating his ideas into finished drawings, making test models or testing his theories. The success with which this can be done depends upon the nature of the engineering work, the creative ability of the engineer and how well he can direct the work of other sub-professional personnel.

The survey participants state that engineering management is required, therefore, to build supporting staffs where it will be most useful. With a little training, they say, most engineers readily take to supervisory work, especially when it directly assists or speeds their work. Too, engineers themselves should request assistance from management in order to aid them in delegating detail work.



On some projects or experiments, the engineer himself has to perform the detail work. Such projects are reported in the minority. The engineer can usually carry the design to rough sketches and specifications. Then, it can be turned over to sub-professional personnel for construction and testing. As this progresses, the engineer may modify the design. This teamwork makes it possible to produce the finished design or model in much less time than the engineer would have required working alone.

CAREERS AS TECHNICAL AIDES

At one of the large communications laboratories, the ratio of technical aides to engineers is steadily increasing as this supporting group is assigned more and more of the detail work. These technical aides are *trained for careers* in their fields. This program is distinct from the engineering training program. Some of the men and women trained as technical aides attend engineering colleges to further their education and eventually become professional engineers.

These technical aides are recruited from technical institutes where they take courses of from 18 months to two years in length. This training gives them the skills and fundamental theory to carry out the instructions of the engineers. Other sources of technical talent are people specially trained by the armed forces or in other industries.

Because of the complex and specialized nature of communications research and development, these people are usually given on-the-job training with individual engineers.

It is evident from recent surveys that the supply of well-trained or qualified technical aides is very limited. However, this situation is eased somewhat by the companies training their own people using as source material technically-inclined high school graduates, college graduates with B.A. degrees and majors in science or mathematics, and people from within the shops.

* * * * *

WHAT TYPES OF EMPLOYEES BEST MEET ENGINEERING STAFF NEEDS?

Several companies reported that they use experienced supervisors and men with actual shop experience to assist their engineers, particularly those engineers with limited experience.

Shop personnel can often be trained to do subordinate engineering work; the technical "know-how" gained in their shop work makes them particularly effective. One

large aircraft manufacturer states: "We encourage the study of engineering subjects at night school and award a large number of scholarships for such study. All employees, including shop personnel, are eligible to apply for scholarships."

A top engineering consulting firm reports that it has found that the use of intelligent women engineering clerks for what was considered "engineers' work" has greatly lightened the engineering workload. This relieves the project engineers from assembling specifications data and making sketches for specifications, thus permitting them to carry on efficient general supervision.

It is apparent that much subordinate engineering work can be turned over to women. This is a good but not widely used source of technical assistants for engineers.

Another good source is technically-inclined high school graduates. Very often the job counselors at the schools can steer likely prospects to the company. This is particularly true if they are given a clear picture of the job opportunities and requirements.

WHAT ENGINEERING DUTIES CAN BE DELEGATED TO SUBORDINATES?

Improved engineer utilization results from a systematic review of engineering work to ascertain that all the routine work has been channeled to subordinate personnel.

Survey replies indicated that subordinate personnel are performing the following duties:

Drafting, designing, incorporating changes on drawings, collecting and collating data, calculating, computations, ordinary layout, expediting.

Cost accounting, keeping records, market research, quantity surveys, filing, requisitioning, checking orders for material, printing, preparation of charts and graphs, expanding standards books, library administration,

Handling details with shops, investigating customer complaints, preventive maintenance, operation of experimental equipment and pilot plants, preparation of parts of surveys and studies, transmittal of information, leg work.

* * * * *

CHAPTER IV

are engineers' talents being wasted?

CHAPTER SUMMARY

What jobs are engineers doing?

- Engineers are top prospects for executive positions
- Sales and executive duties outside engineering use most engineers
- Engineers' responsible positions often make reassignment unfeasible

Where are engineering executives necessary?

- In industries which require a knowledge of engineering
- When an important part of sales, customer and industrial relations
- For *important* non-engineering positions

Professional licenses are advantageous

- Many companies require professional licenses
- National Council of State Boards of Engineering Examiners survey shows registration of engineers is advantageous
- NCSBEE survey shows companies believe registration has raised engineering standards and improved public recognition

INDUSTRY has been accused, at times, of hoarding engineering talent and using engineers for many relatively unimportant technical assignments. The survey indicates that this is not the general practice. Survey replies indicate that 85 per cent of the engineers spend at least three-quarters of their time in technical engineering work.

Where engineers are used for other than strictly engineering work, it is usually in some executive position. In reply to the question, "Do you employ graduate engineers on other than strictly engineering work?" sixty-nine per cent of the companies stated that they did. Their replies indicated that more than half of them employed engineers in executive duties outside the engineering department or in sales. A quarter of them employed engineers in customer relations while almost 20 per cent of them used engineers for industrial relations work. In many cases, the engineers' assignments included more than one of these job categories.

WHAT INDUSTRIES REQUIRE ENGINEERING EXECUTIVES?

There are certain types of industries where it is common to have engineers as executives because a knowledge of engineering is required for the capable administration of the company's affairs. Examples of this are the electric light and power companies, various types of manufacturing, i.e., electronics, aircraft, chemicals, and in such companies as engineering consultants and construction firms. Here, the engineer is called upon to perform such functions as sales, customer and industrial relations of which engineering is an integral part.

Where it is necessary to use an engineer for these functions, the companies are justified in doing so. However, sometimes firms use graduate engineers for these positions when the jobs could be filled just as well by others. In such companies, the survey shows that the engineer can often be used on technical problems to much better advantage to himself and to the company. The fact that only 11 per cent of those replying to the survey indicated that they planned to transfer "general executive duty" engineers to technical work shows the importance attached to engineering training as a base for management positions.

ENGINEERING UTILIZATION QUESTIONNAIRE

A shortage of engineers can sometimes be turned into a surplus by careful study of their assignment within a company. An example of this is provided by a large eastern utility company which made a study of all of its employees who held engineering degrees.

The questions which the company asked department heads sought to determine if those with engineering degrees were performing 100 per cent engineering work and

if not, how much engineering work they were doing. If they were not doing engineering work, the study asked if they were being used to full capacity in their present jobs and if they were capable of advancement as engineers, administrators or supervisors. Additional questions were asked to obtain a more detailed picture of employees' assignments and potentialities.

Results of the study showed that of more than 850 employees with engineering degrees, only 70 per cent were assigned to engineering duties. This group spent two-thirds of their time on engineering work and one-third on non-engineering work. This was equivalent to 45 per cent of the total group spending all of their time on engineering work.

In addition, it was found that 16 per cent of those with engineering degrees were doing non-engineering work but were considered by their departments to be qualified for engineering work. One-fourth of the entire group had limited advancement opportunities in their present jobs. Their experience was analyzed to see whether reassignment would improve their utilization.

To Department Heads:

1. How many men with engineering degrees do you have in your department?

Please give the following information about each employee in your department who holds an engineering degree:

1. Is he doing 100 per cent engineering work?
2. If not, how is his time on engineering duties distributed fractionally? On other types of work?
3. If he is doing 100 per cent non-engineering work, what is his assignment?
4. If he is not in engineering, do you consider him qualified for engineering work?
5. Is he being used to full capacity in his present job?
6. Is he capable of advancement as an engineer, administrator or supervisor?
7. How do you rank his advancement opportunities in his present job?

It was also concluded from the report that all departments should analyze the distribution and assignments of their engineers to determine if changing them would make for better utilization of engineering manpower. A greater use of technicians was recommended in order to use the time of trained engineers more efficiently.

The company has hired a limited number of engineering college graduates since that time and increased its hiring of trained technicians. By careful study of their engineering manpower utilization and by supplementing engineers with skilled technicians, the company now has 150 less engineers of all categories than it did five years ago.

This does not mean that the company reassigned all of its engineers who were doing important administrative executive work to other duties.

Instead, it retained people who were essential in those jobs but reassigned those whose abilities and potential could be used to better advantage in other jobs. Thus, they improved the company's utilization of its valuable engineering manpower and, in many cases, gave the engineers better opportunities for advancement. In this way, both the engineers and the company benefited.

* * *

CONCLUSIONS

* * *

However, there are positions where engineers could be shifted to technical work with satisfaction for both engineer and company.

Also, subordinate personnel can relieve the engineering executive of many of the administrative tasks thus freeing him for more engineering work.

Registration of engineers is now widely accepted by the profession and by industry. Both the NSPE survey and a study by the National Council of State Boards of Engineering Examiners show that registration is growing in favorable acceptance by management and the public.

CHAPTER V

auxiliary sources of engineering talent

CHAPTER SUMMARY

What sources of engineering talent are used?

- Engineering consulting firms used most
- These firms either perform complete engineering jobs or contract engineers' services
- Use of industry-college cooperative plan

Sources of engineering personnel

- Women engineers proved versatile and capable
- Majority of companies would hire women engineers
- Small number makes them limited source of engineers
- College engineering students make good engineering assistants
- Summer vacation assignments

WHAT OTHER SOURCES OF ENGINEERING TALENT ARE BEING USED TO EASE THE ENGINEERING WORKLOAD?

As THE engineering workload has become heavier within their own organizations, at least 50 per cent of the responding companies are using some auxiliary sources of engineering talent to ease the strain on their engineering staffs.

Replies to the survey showed that this was broken down as follows:

ENGINEERING CONSULTING FIRMS	55%
DRAFTING CONTRACT FIRMS	31%
RETIRED ENGINEERS	20%
NON-CITIZEN ENGINEERS	9.8%
RESEARCH ORGANIZATIONS	26%

A growing trend has been for some engineers to work on contract arrangements. The large, long-established engineering consulting firms concentrate on plant design for chemicals, petroleum, steel, electric light and power and heavy equipment engineering. Work turned over to the smaller firms consists mostly of the surplus in electronics, aviation, and automotive fields.

In manufacturing, routine design and production work

is often given to outside contractors. Finished work is done by the company's staff. At times, design problems may be submitted to an outside contractor to obtain a new approach. The volume and type of work which the companies give outside contractors varies not only with their particular production problems but also with their opinions of the effectiveness of outside consultants. In some cases, the sub-contractors are asked to do just the routine design, or they may share design and production functions with the staff. In others, they perform complete engineering functions so that machines are tooled up and ready for immediate production upon their arrival at the plants.

There are generally two types of engineering consulting firms—the "job shop" and the service company. The "job shop" is the more accepted of the two for it performs a complete engineering job. It usually translates a manufacturer's idea or rough design for a component part into a finished engineering package for immediate use by the production staff. Specialization is common—for example, electronics, aeronautics, thermodynamics.

The service companies sell or "contract" the services of engineers who, in turn, work closely with the manufacturers' engineers. The majority of these companies provide skilled engineers at reasonable prices but there are some firms which charge premium rates for the services of their engineering talent. As a result, some manufacturers object to this arrangement.

The National Society of Professional Engineers has adopted the following statement concerning the "contracting" of engineers' services:

"The National Society of Professional Engineers is cognizant of the fact that various firms are entering into contracts merely to supply engineering employees without providing coordination of engineering services and without performing any of the functions or assuming any of the responsibilities usually performed and assumed by engineers supplying engineering services. Some of these are reputable and established firms and their practices are professional and ethical.

"However, some pseudo-engineering firms have been formed solely for the recruitment and placement of engineering personnel in industry. The National Society of Professional Engineers deplores and condemns this latter group and their unethical and unprofessional practices.

"In view of these facts, the National Society of Professional Engineers calls to the attention of all concerned the following statement:

"Any firm offering engineering services must, in conformance with the laws of the state in which it operates, have its operations and control under the direction and responsibility of registered professional engineers."

* * *

COLLEGE ENGINEERING STUDENTS—GOOD ENGINEERING ASSISTANTS

The cooperative engineering student plan has met with great success and is well received in those companies which participate.

A New England utility company, for example, hires cooperative students in pairs. They work 10 weeks and then go to college 10 weeks. This rotation between theory and practice makes them familiar with operations in the field so that they are more productive employees upon completion of their training (and probably better students while in school).

Use of such cooperative students depends upon the relations between the companies and the engineering colleges as well as on their proximity to them. Therefore, the program may not be available to all companies although some work with schools as far as five hundred miles away. It is an idea worth looking into, in any case.

An alternate use of engineering college students is summer vacation assignments. They can serve as engineering assistants, thus relieving the engineers of some routine tasks while supplementing their training with practical work. College students were employed by 66 per cent of the companies surveyed. However, and somewhat surprisingly, only a small percentage of summer employees join the companies following their graduation. This indicates the need for a company selling job.

WOMEN IN ENGINEERING

About women in engineering, there is a great deal of feeling—both pro and con. The consensus is that women engineers are well received where they are now employed. The majority of companies replied that they would hire them if they were available.

Survey replies showed the following results:

WOULD HIRE WOMEN ENGINEERS IF AVAILABLE	65%
HAVE FOUND IT FEASIBLE TO USE WOMEN ENGINEERS	45%
NOW HAVE WOMEN ENGINEERS ON STAFF	23%

* * *

WHAT OTHER PRACTICES ARE BEING USED TO MEET THE ENGINEERING DEMAND?

Survey replies showed that some companies have relaxed hiring standards and are using part-time personnel to meet their engineering needs. However, others stated firmly that they had not relaxed their hiring standards and did not intend to do so in the foreseeable future.

Results of the survey showed that companies took the following steps:

RELAXED AGE STANDARDS	26%
RELAXED EDUCATIONAL REQUIREMENTS	28%
RELAXED REQUIREMENTS ON EXPERIENCE	39%
RELAXED STANDARDS ON PHYSICAL CONDITIONS	19%

* * * * *

(EDITOR'S NOTE: Part II of this report on "How to Improve the Utilization of Engineering Manpower" will be published in the March issue of the AMERICAN ENGINEER. It will include chapters on engineering turnover . . . causes and results, preparing the engineers of the future, report summary and recommendations, and a useful list of suggested readings. Be certain to read Part II in the March issue.)

Engineering Around the World

Your National Engineers' Week Feature Story On Outstanding Professional Accomplishments From Italy To Australia

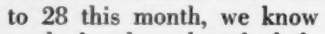
THE accomplishments of the engineer in the United States are familiar and close to all of us. Our great industries from steel to plastics, from textiles even to cosmetics, our superior agricultural development, our highway and communications systems, our cities themselves all pay tribute in one way or another to the achievements of engineering genius.

When we celebrate NATIONAL ENGINEERS' WEEK from February 22 to 28 this month, we know that we have much to be proud of and much to look forward to. The engineer members of our industrial teams, our engineering professors, our design engineers and consultants, and those who have stepped out into the realm of public service—at the municipal level, in Congress, on the Atomic Energy Commission, and in the new Cabinet—are actively demonstrating that engineering is *the* profession of the Twentieth Century.

In fact, it is almost trite to make that statement where the United States is concerned since good engineering is so obviously basic to our development. But what is the story throughout the rest of the world? What contributions are professional engineers making in Italy, for instance? Or Pakistan?

To pin down at least a partial answer to this important question, your AMERICAN ENGINEER recently queried the ambassadors of a number of representative countries scattered around the globe. "What are professional engineers accomplishing in your country?" we asked. "What about engineering education? Professional societies? And have our U. S. engineers contributed in any way?"

The replies we received in this spot survey were varied and interesting and indicate that around the free world, at least, the engineer is definitely the man of the hour.



LIKE the United States, Canada, our neighbor to the north, is a land of opportunity for the engineer. From a primary dependency on agriculture, fishing, mining, and lumbering prior to 1914, almost overnight Canada has become an industrial giant. Since the beginning of World War II, her national production and standard of living have jumped 50 per cent.

Engineering skill has contributed to the development of industries turning out products as varied as jet engines, roller bearings, optical goods, stainless steel equipment and hollow ware, high carbon bits, noiseless typewriters, pyrex nursing bottles and baby carriages. An energetic atomic research program is being conducted. Newly-discovered iron ore deposits are being opened to development in the interior of the Quebec-Labrador peninsula, which also means that new railroads and other lines of communication will have to go under rapid construction.

Already boasting the largest single aluminum plant in the world at Arvida in the Saguenay valley of northern Quebec, Canadian engineers are currently planning even bigger things. The Nechako-Kitimat project of the Aluminum Company of Canada in British Columbia, which ultimately will produce 550,000 tons of aluminum per year, will probably give Canada a sizable edge on the United States as the world's largest producer of the lightweight metal. The supporting hydroelectric plant being built at Kemano will be the world's biggest underground powerhouse.

Canadian engineers are also figuring prominently in the government's plan to go ahead with its own St. Lawrence Seaway project without waiting for United States support, and in the development of a $100 million water program to provide for an area from the Saguenay region to the Gaspé peninsula.

There are professional engineering societies in Canada comparable to those in this country, and the Engineering Institute of Canada is a universally recognized organization. Educational and technical training facilities are excellent, but the Canadians, too, are faced with a shortage of qualified engineers. The Engineering Institute, however, has recently predicted a small upswing in the number of graduates by 1955.

A hefty employee of the Beauharnois Power House is dwarfed by the giant generators which provide much of the power of Eastern Quebec. Turbines are run by a head of water from the St. Lawrence Seaway diverted through a canal 3,000 feet wide.

Photo by Malak Studio, Ottawa

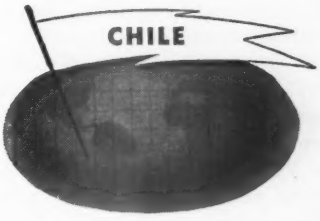
TRAVELING south in the Western Hemisphere, to Venezuela, we find it another country with tremendous undeveloped resources and frontiers, a field for the engineer-explorer.

The fame of the Venezuelan petroleum industry is world-wide; 1952 alone saw an average daily production of 1,767,582 barrels of oil. In addition, coal, manganese, copper, and bauxite deposits remain to be fully explored, and it is believed that there are radioactive minerals in the Andes and the Guayana region.

There has been a good deal of cooperation between United States and Venezuelan engineers toward the development of local industries. U. S. Steel's Orinoco Mining Company is currently working to develop *Cerro Bolivar,* the 4,000 ft. wide, 1,800 ft. high mountain, estimated to contain one-half billion tons of high grade iron ore. Firestone is building a $4 million tire and tube plant in Valencia. Venezuelan chemists and chemical engineers are now being trained at Celanese Corporation plants in the United States to take over the synthetic fibre production of *Celanese Venezolana, S. A.,* whose first plant has been established also at Valencia.

Irrigation, housing and other public work programs have claimed professional attention. A super "Rockefeller Center" is being built in the heart of Caracas, and engineers of the Municipal Works Division have embarked on a $42,000,000 street and highway expansion program for the capital city. Under the Ministry of Public Works' direction a French engineering firm is carving a highway —the *Autopista*—through the foothills of the Andes from Caracas to La Guaira that will eliminate 300 dangerous curves in the old route. The Bureau of Sanitary Works' new *La Mariposa* Reservoir new Caracas has a 250,000,000 gallon capacity. A companion development in the water purification program, the *Agua Fria* Reservoir, holds 154,000,000 gallons.

While some Venezuelan engineers have gone abroad for their training, engineering subjects are available at the three universities—Central in Caracas, Los Andes in Merida, and Zulia in Maracaibo. Individual achievement has also been high. As one example, Dr. Gonzales Vale, a civil engineering graduate of Los Andes and later a student at the Yale School of Forestry, recently received the Pan American Conservation Award of Merit for 1952. Notable progress in safety engineering has also been made by LAV—*Linea Aeropostal Venezolana*—which has received the Inter-American Air Safety Award for three successive years.



IN Chile, professional engineers have made their greatest contributions in building, irrigation, hydroelectric projects, and road construction. The new Lautaro Dam, located in the province of Atacama, irrigates approximately 25,000 acres; the Recoleta and Cogoti Dams in Coquimbo service about 35,000 acres each. Important hydroelectric works, harnessing the country's vast water resources, include Pilmaiquen, providing 24,000 KW; Abanico, 86,000 KW; Sauzal, 75,000 KW; and Cipreses, which will furnish 80,000 when completed.

Chilean engineers have also developed the country's 22,000-mile network of roads; of particular interest is the 350-mile, four-lane highway between La Serena and Talca, the La Serena-Santiago section of which is part of the Pan American Highway and is named for Franklin D. Roosevelt. In addition, the engineers have participated in expanding and maintaining the excellent railway system and in developing such local industries as cement, window glass, and newsprint. They have designed and built a new nitrate plant in Tarapaca Province with an annual capacity of 150,000 tons. The new Paipot copper refinery, producing 15,000 tons of blister copper a year, was designed by U. S. engineers, but built by Chileans.

The most important single joint achievement of American and Chilean engineers is the integrated steel mill in Concepción Province that began operating in 1950 and now has a rated ingot capacity of 300,000 tons annually. There has also been considerable collaboration in the geological and geophysical surveys preceding the development of oil and gas wells in the Province of Magallanes. Other examples of cooperative effort are found in the large oil refinery now under construction near Valparaiso, as well as in various phases of the copper, nitrate, and iron industries.

Chilean schools provide engineering education oppor-

Right: Workmen dig foundation for a new twenty-six story building. Across the Avenue is one of the recently completed eight-story office buildings. Architecture is modern and completely functional, designed to take full advantage of natural sunlight. Below: Two scrapers churn their way along the unfinished highway through the longest cut, one of the largest in the world, of the Autopista.

Photos by Hamilton Wright

tunities equivalent to a Master's degree in the United States. Formerly the chief emphasis was on civil engineering as providing the broadest base to cope with the country's developmental problems, but today there is a growing tendency toward specialization. There are five schools of engineering of university level, three high-level Technical Institutes, and three Schools of Mines; the Chilean Naval Academy also offers one of the best mechanical engineering courses.

Chile has a number of professional engineering societies similar to those in the United States. The Institute of Engineers of Chile was established in 1888 and publishes a bimonthly journal. Highly civic-minded representatives of the various professional societies consistently serve as *ex-officio* members of various governmental boards guiding the country's public works and industrial development programs.

ACROSS the Atlantic, the United Kingdom is steeped in engineering history. Many of the developments that sparked the industrial revolution and thus contributed to the growth of this profession were the work of British inventors, and the pioneering efforts of British engineers in the railway and shipbuilding industries are well known.

Eighty feet below London's street level men worked day and night to link Waterloo Station, a South London railroad terminal, with the nearby site of the Festival of Britain. The tunnel, 26 feet in diameter, runs from a subway station adjoining the railway terminal to the site, where three banks of escalators carry people to the surface.

Photo by the British Information Services

Today all branches of the profession are flourishing in fields from steel and coal to electronics and atomic research, from the Scottish textile industries to a new industrial chemical project under way in Wales. In 42 industries the competing firms maintain cooperative research associations to work out common problems. The 1951 Festival of Britain exhibits high-lighted numerous outstandingly original engineering achievements.

The extent of industrial expansion has made demands upon United Kingdom fuel and power resources that only engineers can solve. One recent answer has been the construction of the new Fasnakyle power station in North Scotland as part of the Millardoch-Fasnakyle-Affric scheme which will generate about 230 million units of electricity a year. The Claerwen Dam, in Wales is the latest addition to a series of impounding reservoirs to supply water from the mountains to Birmingham.

Town planning is one of the biggest jobs for British engineers today. In such places as Corby, Northamptonshire, and Peterlee in East Durham, where completely new towns are being constructed, they have been working directly with the architects from the start of the projects to lay out roads, bridges, utility lines, and other necessary engineering features. In other areas, such as the Lansbury district in London's East End, they have been contributing to the replacement of slums with model community developments.

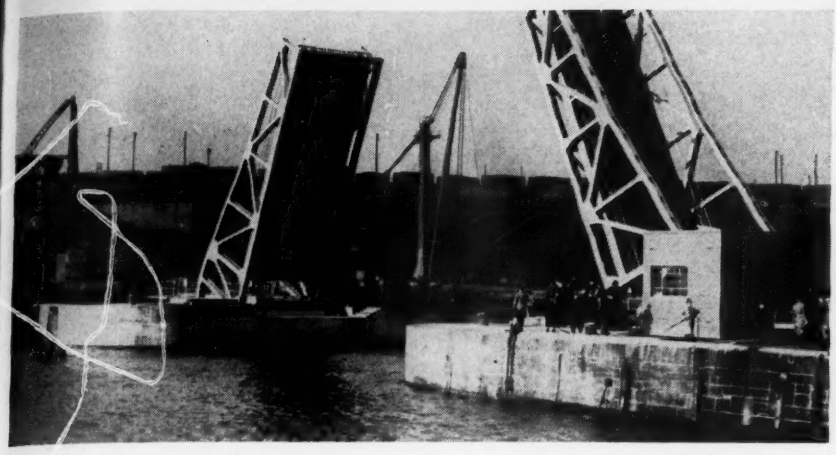
United Kingdom engineers have also gone far afield, many firms serving as consultants, designers, or equipment suppliers for engineering programs and projects throughout Africa and the Middle East.

Educational opportunities are excellent; in England and Wales there are eleven universities and two independent university colleges providing engineering courses, as well as many technical schools. There has been a large upsurge in the number of graduates since the war, and the current problem is to maintain this number to meet the demand for qualified technical men.

Professional associations, including the Women's Engineering Society, are numerous. The Society of Engineers, Inc., established in 1854, like NSPE is open to men from all branches, and works to improve the status of the profession as well as to facilitate the advance of technical knowledge.

ACROSS the English channel, the Netherlands stands out as a nation in the forefront of engineering accomplishment. The old saying, "God created the world, with the exception of Holland, which was created by the Dutchmen themselves," rings very true when one considers the country's century-old reclamation battle, the latest phase of which has seen the Zuider Zee enclosed and transformed into a freshwater lake, the *IJsselmeer*, which is now being reclaimed piece by piece and turned into useful farm land. Two polders (areas which have to be protected by dykes against high water) containing 49,000 and 117,000 acres respectively, are already being farmed; work began in June 1950 on a 129,500-acre area; and two more such districts are in the planning stages.

Engineer specialists in town-planning also find plenty of work cut out for them as they lay out small model



The first of its kind in Britain, an aluminum bridge was recently opened at Sunderland, England. Spanning a 90 ft. wide junction between two docks, the bridge weighs only 54 tons, and can be raised in about a minute. It was built by Head Wrightson and Company of Thornaby, Yorkshire, and cost £85,000 ($340,000) to build.

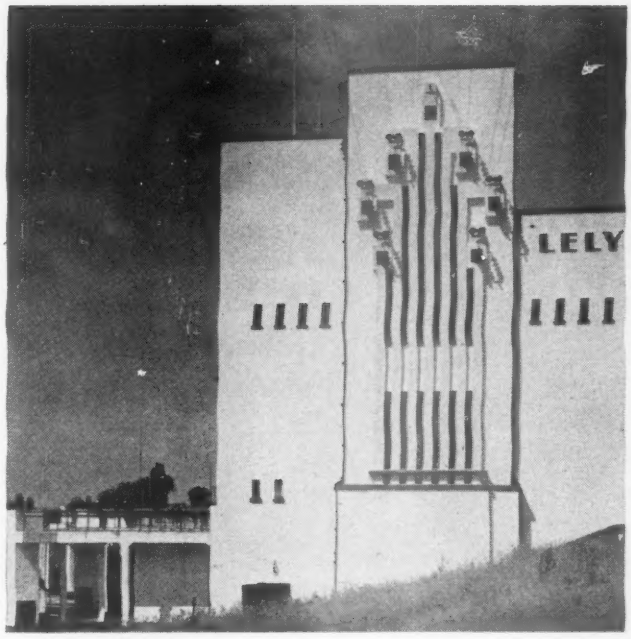
Photo by the British Information Services

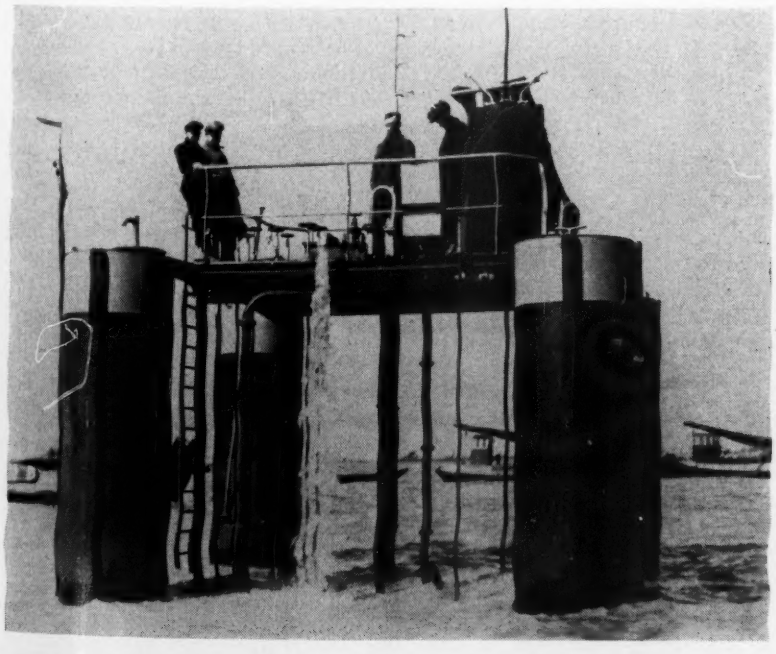
communities on the reclaimed land. To achieve speed and efficiency, the pre-fab industry provides many of the farm buildings.

The Germans inundated the Wieringermeer Polder before the advancing Allies in 1945, but the combined efforts of British, American, and Netherlands engineers brought about speedy reclamation of that and other submerged lands. The rebuilding of the city and harbor of Rotterdam and the Amsterdam harbor represented other reconstruction achievements.

Netherlands engineers are also prominent in the electric, electronic, and optical fields. Flourishing coal, steel, chemical, and oil industries also lay claim to their talents. Frequent contributions are made in the realm of engineering inventions, such as a snorkel breathing device for submarines that came from engineers of the Royal Netherlands Navy.

The School of Engineering at Delft boasted a 5,569 enrollment for the 1950-51 school year, being outstripped only by enrollment figures for medical students. It offers degrees in eleven different branches of engineering; all the courses are of five-year duration with the exception of that for engineer-architect, which takes from five to six years.





Above: Contrary to general belief, Holland is not just a country of windmills and dykes. Architecture has adapted modern styles and experts all over the world have marveled at the high degree to which the Dutch have developed their new buildings. The picture is a modern watermill in Dutch polderland.

Left: A floating boring apparatus in the Zuider Zee where one day the East Polder shall arise.

Photos by Netherlands Information Bureau

THE chief task in recent years for Italian engineers, according to Signor Alberto Tarchiani, Italy's present Ambassador to the United States, has been the rebuilding of the country's industries and public works in the wake of World War II destruction. Figures furnished by the Ambassador indicate that immediately after the war the country faced $720 million worth of industrial destruction and about $800 million worth of damages in highways, port installations and aqueducts. Merchant marine tonnage had been reduced from 3.4 million tons to 429,000, and the railways had lost one-fourth of their roadbeds as well as many masonry and steel bridges and a high percentage of their rolling stock.

By 1951, however, the index of industrial production was 37 per cent above its pre-war level. By 1949 the merchant marine tonnage had regained the pre-war mark. and the railway system is now back to normal. In addition, in the field of public housing 5 million rooms have been repaired or newly built; 31 thousand kilometers of roads and highways have been repaired together with 1,345 bridges on national highways and 4,299 on regional highways. Two thousand kilometers of aqueducts have also been rebuilt.

The recovery was accomplished largely through intensive application of local engineering skills augmented by technical assistance provided by United States engineers and scientists and funds furnished through ECA. The Stanford Research Institute conducted a survey of the Italian mechanical industry which is being used as one of the most important reference sources by a special government commission studying its problems. American experts have also been enlisted to aid the efforts of a new technical management institute created by the Association of Industrialists of Turin.

All major Italian universities have an engineering faculty, and U. S. laboratory equipment now available has added to the efficiency of the courses. The enrollment is large and satisfactory. There is also a National Association of Engineers which aims to study the common problems and promote the common interests of all members of the profession.

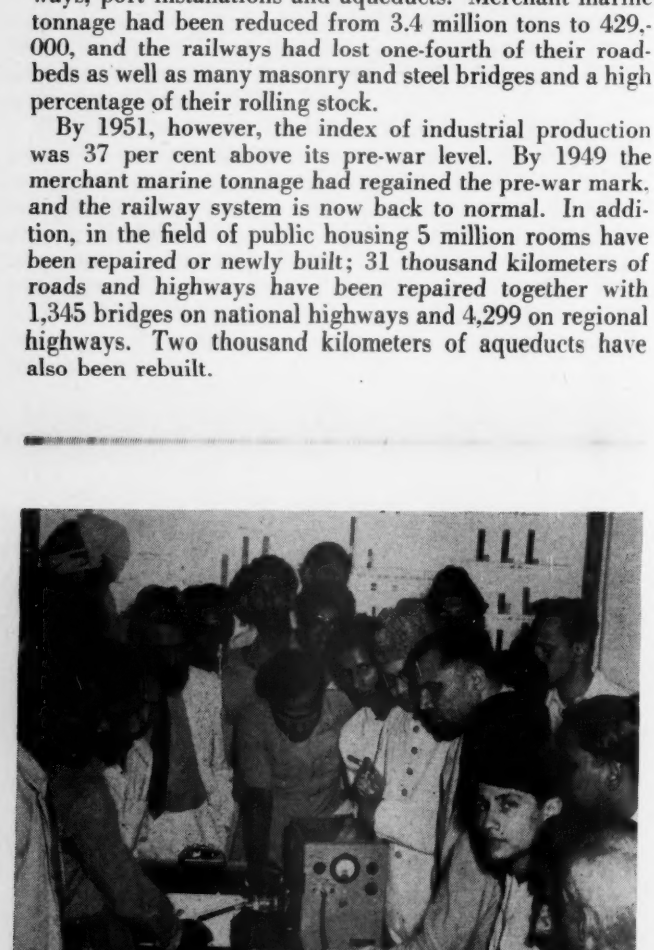
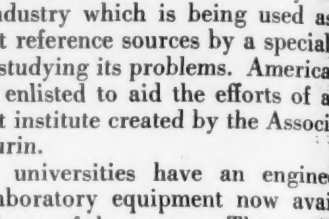


Photo by Pakistan Government

The Honorable Sardar Bahadur Khan, Minister for Communications, visited the Pakistan Industrial Exhibition, being held at Karachi. The Minister took keen interest in the Posts and Telegraphers Stall and is seen in the picture with "his men and machines." Mr. Musarrat Hussain Zuberi, Joint Secretary, Communications, is seen on the Minister's right with cigar in hand.



ON the Asiatic continent, the engineers of newly-independent Pakistan are working on various developmental facilities, including roads and hydroelectric and irrigation projects. UN Technical Cooperation Administration support has been enlisted, and numerous experts, including many from the United States, have surveyed various problems of the area. In addition, fellowships for technical study abroad have been awarded to a number of Pakistan nationals through the UN and specialized agencies.

While in a relatively early stage of industrial growth, the country has many resources that may be effectively developed through the application of engineering skills. Cast iron and steel foundries are located throughout the area; the forest products industries offer excellent potential for the future; and construction of a $12,000,000 fertilizer factory, which will produce 50,000 tons of ammonium sulphate and will include a power plant and auxiliary services, is a current project at Mari Indus-Daud Khel. A third of the funds for the latter development, plus technical assistance, are being provided under the U. S. Point Four Program.

Two Pakistan engineers, P. B. A. Saleem and Bakhtiyar Husain, assistant directors in the Navigation Directorate of the Central Engineering Authority, Ministry of Industries, have recently received a year's intensive training in Canada in hydraulic engineering. Their knowledge derived from this study will be applied in the inland navigation program the government is planning. Previously they had assisted in the establishment of the port of Chalna, working with several European hydrographic survey specialists.

At present there are two technical high schools and three engineering colleges in Pakistan; and Peshawar University, which was established in 1950, has, as one of its goals, the organization of a department of electrical and mechanical engineering. There is room and need, however, for much greater expansion.

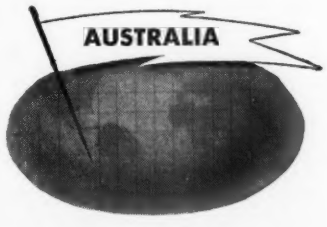
The Punjab Engineering Congress sponsors the publication of technical literature and acts to promote the interests of the profession, which should be one of the most important factors in the country's growth.

PHILIPPINE engineers, like those in Pakistan, will have an increasingly vital role to play as the industrialization of the island republic progresses. They have already made distinctive contributions to the reconstruction of various cities and facilities which were reduced to rubble and uselessness during the course of World War II. The restoration of Manila, the war's most-devastated city, for instance, was accomplished in record time that surprised even the most optimistic persons.

There is an almost unlimited variety of untapped raw materials throughout the archipelago that gives much promise for the future. While the country's economic status has had a primarily agricultural basis to date, it is felt that industrialization, which will be largely the responsibility of Philippine engineers, will open a new economic era for the people.

Already many new industries are springing up in the islands. Of very recent interest has been the start of operations of a new steel drum manufacturing company in Mandaluyong, which is capable of producing 300,000 fifty-five gallon steel drums per year on a one-shift-per-day basis. The possibility of local aircraft manufacture using Philippine materials exclusively is now being explored as plans get under way to test a plane made of bamboo and other Philippine woods.

As the nerve-center of this industrialization program as well as of plans for agricultural expansion, the most far-reaching of all Asiatic power projects are under way in the Philippines. The Philippine Hydroelectric Program is scheduled to cover a five year period and is being administered by Filemon C. Rodriguez, manager of the National Power Corporation. The Ambuklao and Binga Projects on the Agno River and the Lumot River Diversion Project will provide a tremendous increase in Luzon's power potential. The Maria Cristina Project on the Agus River in Mindanao will vastly improve electric facilities on that island and also will include an ammonium sulphate plant with a 126,000 ton annual capacity. In addition, various small projects will be located throughout the islands to replace fuel-generated power. When completed, it is estimated that the varying projects will save at least 33 million pesos a year in fuel imports, as well as providing a greater incentive to industrial development.



AUSTRALIA's ambassador, Sir Percy C. Spender, reported on a vast developmental program being undertaken in his country. Australia has much first-class engineering talent, and universities and technical colleges are providing the best possible training; but because of the large demand and the limited population, professional assistance is also obtained from many foreign countries.

Water, the life-blood of the country, is scarce and precious. Several projects to improve the situation are now in progress; and American engineers have been taking a leading part in the greatest of all — The Snowy Mountains Project, where construction of seven major dams and eighty miles of tunnels is only a portion of the task of reversing the flow of rivers passing through the mountains so that the water and power potential can be put to practical use. A Norwegian firm is in charge of the actual construction.

Australian Official Photograph by W. Brindle

Dr. K. W. Rhonstock, head of the Snowy Mountains Authority's Geodetic Engineering Section of the Scientific Services Branch. His job is no less breathtaking than his title—he is seen here examining one of the Wild T3 theodolites that he will use in guiding 17-mile long tunnels beneath thousands of feet of the Australian Alps.

In addition, Ambassador Spender reported that "Australia's uranium deposits are now being developed by your engineers working side by side with ours. The latest of a long line of Australian-made aircraft is your own Sabre F-86 which will soon be coming from our factories, higher powered than those now in service. Roads, aerodromes, railway rehabilitation, ports, telecommunications, metals refining, mines, shipbuilding, and a score of other major activities are currently being undertaken. The influence of American engineers and American equipment plays a most valuable part in each one of these fields of endeavor."

There are many specialized groups of professional engineers in Australia, but the Institute of Engineers is recognized as the authoritative organization representing all. It numbers 8,500 members, a relatively large figure when projected against the total population; and its object is "to promote and advance the science and practice of engineering in all its branches and to facilitate the exchange of information and ideas in relation thereto."

...an engineer's century

These are only a few of the countries where professional engineers are playing a leading role. To catalogue and report in detail on their world-wide accomplishments would be an almost endless task. The important thing that your AMERICAN ENGINEER has discovered through this spot survey, however, is the high regard in which the engineer is held in varying countries all over the globe. He is the instigator behind much of their technological and economic progress and the man to whom they look to promote their further industrialization, develop their resources, and raise their living standards.

NATIONAL ENGINEERS' WEEK is strictly a United States celebration, but a bird's-eye view of the profession all over the world shows that everywhere this is very much the engineers' century.—*End.*

THE HUMAN FACTOR IN ENGINEERING WORK

Progressive Management is Finding That the Human Side of Engineering Work is Equally Important with Having the Best Tools and Equipment. Read of the Fascinating Roles of Psychiatry and Psychology in Modern Industry. Here is Du Pont's Story.

By David A. Heller

WHAT causes engineering skills and talents to be frustrated, bottled up or misdirected? What part do emotional problems and mental upsets play in the work-lives of each of us?

As a supplement to its article based on the second Executive Research Survey, "How to Improve the Utilization of Engineering Manpower," the AMERICAN ENGINEER interviewed several authorities to report something of the role of industrial psychiatry in modern industry. More importantly, to report what we may expect from it in the future.

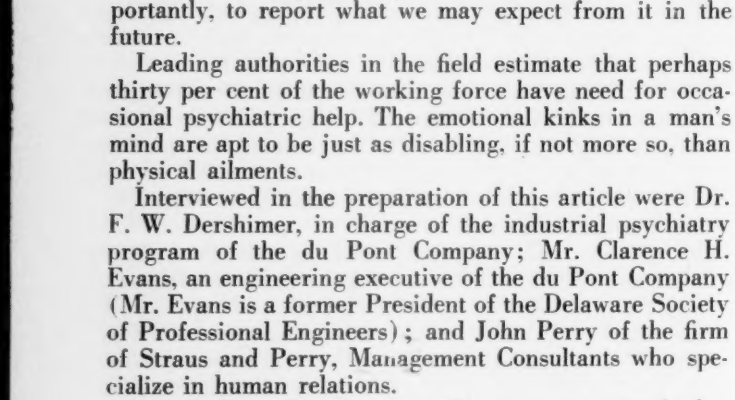
Leading authorities in the field estimate that perhaps thirty per cent of the working force have need for occasional psychiatric help. The emotional kinks in a man's mind are apt to be just as disabling, if not more so, than physical ailments.

Interviewed in the preparation of this article were Dr. F. W. Dershimer, in charge of the industrial psychiatry program of the du Pont Company; Mr. Clarence H. Evans, an engineering executive of the du Pont Company (Mr. Evans is a former President of the Delaware Society of Professional Engineers); and John Perry of the firm of Straus and Perry, Management Consultants who specialize in human relations.

The du Pont Company was chosen as an example, because, so far as the AMERICAN ENGINEER could learn, it was the first large manufacturing company in the United States to employ the full-time services of a psychiatrist. Dr. Dershimer has been with the company for nine years and has been in charge of the psychiatric program since its inception. He now has a full-time associate, Dr. Gerald Gordon.

Experience has shown that the unsettled emotional problems of employees which, less than a generation ago, were considered none of the employer's business or concern (and still are unless they affect the employee's work), can slow down production, result in an appalling accident rate, and, on the part of the individual concerned, can assume mountainous proportions which can result in all kinds of undesirable manifestations. These unpleasant symptoms include keeping the individual from reaching the professional and personal development which his ability and character merit, getting him involved in a serious accident, (as this article will point out later, persons with emotional problems are many times more liable to get hurt than mentally healthy persons), and even rare and extreme cases of actually unseating the individual's reason.

Du Pont engineers look over safety reports. Peace of mind means fewer accidents.



ALL of us should be interested in this problem, for it is easily demonstrable that man is an irrational, as well as a rational, being. There is a rich reward for both management and employee in successfully dealing with irrational behavior at work. For the employee, the goal is a richer, fuller and happier life, with greater achievement and higher and better jobs. For management, there is greater production at less cost.

Since we're all bristling with vanities, prejudices and ambitions, we had best learn to recognize and deal with the frustrating behavior to which they are likely to lead us.

Progressive companies are finding industrial psychiatry a valuable aid in the constant problem of learning how to help men and women do their jobs well. Far from being only concerned with pathologic individuals, the industrial psychiatrist also deals with group relationships and group behavior patterns.

There are a great many skeptics who wonder what practical good industrial psychiatry can do. They will grant the existence of tensions and pressures, but they scoff at the notion that "going to have one's head examined" can give really practical help in the situation.

Perhaps the best answer that can be shown to them is an increase in the efficiency of a research group of 160 people in the du Pont Company, which has developed a score of products which have become household words. This increase was due in considerable measure to an experiment in management carried out by a research director in consultation with Dr. Dershimer.

"There has always been a mistaken idea," Dr. Dershimer says, "that people who are doing creative work cannot work under a deadline. This idea held that it was impossible to put a time limit on progressing from the unknown, in this case a research problem, to the known—the answer. There are several of us who did not think this theory was true.

"As an experiment, deadlines were put on research projects. A seemingly amazing thing happened. Production in the research group practically doubled. Most of the deadlines in this highly creative field were met, satisfactorily and on time."

To what is this attributed?

"I think it is attributable to straightening out the mental processes of the scientists and engineers concerned," Dr. Dershimer said. "When all emphasis was put on performance, they discarded the extraneous and concentrated on the most promising leads."

Interestingly enough, a short time after this step was taken, the plant physician where this laboratory is located, had a question for Dr. Dershimer. "What happened to these people in the research department?" he asked. "They used to be upset all the time, always complaining of nervous conditions, of their management, working conditions, etc. They used to be in the hospital all the time. Now I don't see them any more as patients. What happened?"

Dr. Dershimer credits the improvement to better supervision requiring more sensible and productive behavior at work.

WITH the tremendous shortage of professional engineers which now faces the nation, we cannot afford the luxury of maladjusted engineers, to say nothing of the human values involved. So there seems to be considerable need of more work in the industrial psychiatry and psychology fields among engineers.

Worst of all, according to Mr. Perry, the engineer is sometimes an unwitting accomplice in causing frustrations and loss of efficiency in industry. How does this come about?

"An engineer lays out a plant in terms of machines and work flow," Mr. Perry says. "But what about the men who man the machines? The engineer knows precisely what a machine will do; he studied for years to learn. But has he been trained to understand what a man will do—not what he *can* do or *should* do, what he *will* do?"

Mr. Perry cites the case of a superefficient factory where production was snarled several times each week.

"It was beautifully integrated," he says, "and when it ran according to plan it was wonderful to watch. But it didn't run that way often. It was so well integrated that if, anywhere in the plant, a man fell down, the company was out of business until he picked himself up. There was no allowance in the design for human variables—for absenteeism, turnover, forgetfulness or occasional visits to the washroom. As a result, everyone was under constant tension. Few men were comfortable in their jobs. Some men had to work faster than their normal pace, others slower, and none of them enjoyed it. When a strike was called, on a perfectly silly issue, it seemed to me the men's real desire was a break in the monotony."

Engineers themselves often become frustrated in such situations, Mr. Perry asserts. "They expect people to behave logically and rationally. How would an engineer feel about a machine that responded unpredictably, talked back, misunderstood its instructions, argued with other machines and came in late with a hangover on Monday? Engineers who are trained in the discipline of mechanics often have difficulty in dealing with the emotional motivations of men."

In many industries, Mr. Perry points out, engineers are falling behind in the competition for top management positions. "Ability to deal with people" has become a primary requirement for executive jobs. Sales and industrial relations executives are often chosen for top jobs because of this ability.

"The best schools of engineering have recognized this," Mr. Perry says. "At M.I.T., for example, many engineers are studying psychology and labor relations as part of their training."

MR. Perry smilingly insists that he likes engineers. But he shows signs of frustration himself when someone mentions the term "human engineering."

"There just isn't any such thing," he declares, "and pretending that there is will lead to some very sour decisions. It suggests that people can be manipulated like materials. It suggests one-way communication. It overlooks the fact that every plant has its share of neurotics and psychotics, and that any one of them can upset all the fine master-minding that goes on in the front office."

Let's return to Dr. Dershimer, who would not agree with Mr. Perry in some things.

"Industrial psychiatry is a new approach to understanding some of the problems of our free enterprise system," he said. "It is in an early stage of development and we really can't be too sure of anything about it. There is, however, another area in which we feel reasonably sure

Engineers should know what *men* can do as well as machines.

that it's doing some good. That's in safety and accident prevention work."

The du Pont Company has won practically every safety award given, and one of its plants, at Martinsville, Virginia, holds the world's safety record—more than 28 million man-hours' exposure without injury. If an individual were to work long enough to equal that record, he would have to have started at 12,000 B.C. and worked until the present to do so! Other du Pont plants have also established outstanding safety records.

So, if Dr. Dershimer believes industrial psychiatry can bring about such results, his views must be given considerable weight. Here's what he says:

"More than 80 per cent of all industrial accidents can be traced directly to human failures on the part of the individual concerned. A small percentage of the workers account for a large percentage of the accidents. Such persons are 'accident prone.' One of our plants, for the year 1947, showed that 30 per cent of the employees accounted for 100 per cent of the accidents. Three per cent had between three and ten injuries each.

"What is the cause of these human failures? I am convinced that it is the failure of some supervisors to correct poor disability wage records, poor safety records, repeated job difficulties requiring extra supervision, a large amount of which can be traced to a core of emotional disturbance in the employee. Accidents and other personnel

problems are far higher among the emotionally disturbed."

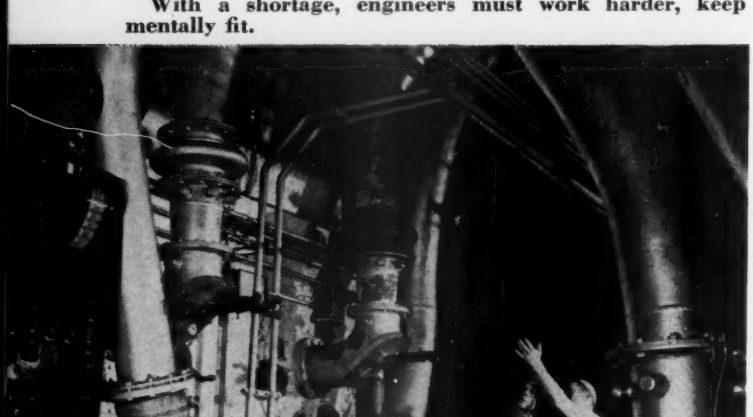
What should be done about this?

"A lot of people will undoubtedly think I'm a mean old so-and-so," replies Dr. Dershimer, "but I am convinced from my experience that the common practice of granting special consideration to emotionally disturbed persons is exactly the wrong thing to do. Sympathy is desirable, but it should not be translated into endless coddling and appeasement.

"The sickest individuals are usually those who have had the most done for them and from whom the least is expected in return," as Dr. Gerald Gordon, Dr. Dershimer's associate psychiatrist in the du Pont Company, pointed out in a recent paper. "Industry through management and supervision, can best help the emotionally sick employee by requiring normal performance from him.

"Finding ways to get such individuals to live up to their normal responsibilities is the best thing that can happen to them. Mental health and well-being improves with responsible behavior.

With a shortage, engineers must work harder, keep mentally fit.



MR. Evans, listening in on the interview, interjected a story about an engineer formerly under his supervision. "This man was transferred to my group after earlier moves from three different assignments, all of which were performed unsatisfactorily from the point of view of his previous supervision," he said.

"This man had a Doctor's degree in engineering. The men he worked with previously had only Bachelor's degrees. He felt superior to them and 'degraded' by the work he was doing (despite the fact that he was not doing it satisfactorily and they were). He felt that the magnitude and complexity of the work was not up to what he could and should be doing.

"This individual also complained at various times of headaches, eye troubles, and stomach upsets, although the company's doctors repeatedly examined him and found no organic disease.

"Following Dr. Dershimer's policy, I talked with this engineer, challenged him to live up to the promise of his ability. I told him firmly that he would be required to produce as much as the average of my group. By not giving him any special dispensations, but seeing that he received all necessary assistance in bringing his work up to the standard, a minor miracle was accomplished. The engineer straightened up, did his work well, has since received several salary increases, and has been transferred to a more responsible job where he is now supervising other men. Incidentally his headaches, eye troubles, and stomach upsets disappeared."

Dr. Dershimer tells the story of the engineer who was a perfectionist, who sought psychiatric help. (It is never thrust upon du Pont employees.) "He earned his money, but his attitude of not being able to see the forest for the trees, of concentrating on picayune details at the expense of big objectives, indicated that he would never go far in his work. He attributed his nervousness to his job. In conference, we learned that the basic root of his problem was an unsatisfactory domestic life."

The majority of job difficulties arise from causes completely outside the job, Dr. Dershimer believes. These are mainly domestic difficulties.

Running away from problems is the biggest single cause of nervous breakdowns, emotional and mental problems, Dr. Dershimer asserts. "It sounds obvious," he says, "but standing up to and solving one's problems is the only way to handle them. The longer they are put off, the more mountainous they seem. No matter how bad the reality is, even if the very worst were actually to happen (a rare case, he says), it is better than harrowing uncertainty." He added, "Engineers tell me this is a sound engineering principle, so it should not surprise them."

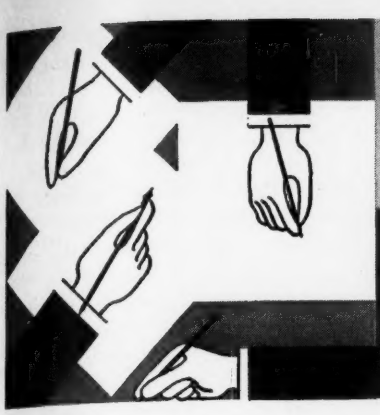
IN the previous example, the engineer accepted and acted to meet his domestic situation sensibly and courageously. He promptly improved in both his symptoms and productivity. On the basis of many such cases, Dr. Dershimer predicts that this improvement will continue as long as the man continues to act responsibly.

Dr. Dershimer has some good advice for engineers who are readers of the AMERICAN ENGINEER (and everybody else, for that matter). Emotions, he says, are like safety valves. If you block them off—it's like tying down the safety valve—you create enormous pressures. For example, if you think the boss is a no good so-and-so, go ahead and think so without trying to repress your *thoughts*. Most of us feel guilty about thoughts which we believe are "unworthy." Of course, Dr. Dershimer points out, your *actions* should conform to accepted behavior. It's just that you should accept your freedom to feel and think what you like. Chances are, you'll feel a lot better about it. Don't feel guilty about things you think about. "Everybody has about the same secrets," he says. "In my view, it's perfectly all right to feel and think as you please, as long as you behave acceptably and do your job."

Using an engineering simile, Dr. Dershimer reports that trying to block an emotion is like trying to destroy energy. It simply can't be done. The blocked emotions are just converted into some other, usually harmful, form.

Here's a final bit of advice about how you should treat fellow employees who are having emotional or mental troubles. Don't try to "cheer them up" by special attention or special dispensations. One reason why people with mental or emotional problems have trouble working back into their job relationships is that other people are "mistakenly nice" to them. Standard procedure at the du Pont Company is to treat such persons just like anybody else when they return to work, Dr. Dershimer says. Special treatment, and other "considerations" are really harmful, he has demonstrated in hundreds of cases.

The increased strain put on many engineers because the shortage of engineers requires increased individual production, with engineering staffs often spread dangerously thin, makes it natural that mental hygiene will play an important role in the utilization of engineers.—*End.*



Professional POSTSCRIPTS

Engineer Knox A. Powell, P. E., of Minneapolis and the Minnesota SPE, has written a very thoughtful piece covering the "Basic Economics of Engineering-Management Relations." It was originally read before the MSPE's Committee on Engineers in Industry, and we are happy to print it here.

—PP—

ENGINEERING-MANAGEMENT relations may vary widely over short periods, but they are ultimately shaped by basic economic forces. Although economic forces cannot be overthrown, if intelligently understood, they can be used toward desirable ends.

The difficulty of understanding economic forces and their basic laws of action seems to lie in the difficulty of small scale, short time laboratory demonstration. Engineers traditionally rely upon test demonstration to investigate physical forces, but engineers should be versatile enough to study the less approachable forces of economics also.

The value of anything at a specific time is, of course, determined by supply and demand. However, the basic forces controlling supply and demand over a long period of time are less well known.

On the supply side, over the long run, wages tend to subsistence and profits likewise tend to replacement. If wages fall below subsistence, some labor is automatically eliminated. If profits fall below replacement, industry automatically shrivels. The problem of supply becomes a matter of controlling subsistence and profits.

Many social schemes aim at controlling supply without controlling subsistence and profit levels. Some schemes work for a time, like a Holland dike, but eventually they are as futile as King Canute's command to the tide. Perhaps we could commit suicide ahead of starvation or go out of business ahead of bankruptcy, but no such large scale self-determined limits are in sight unless perhaps behind the Iron Curtain.

Reducing waste and increasing efficiency, both in subsistence and in profit, seems to be the only reasonable way to counter the inevitable economic tendency to limit supply by the sheer exhaustion of labor and of industry.

On the demand side, over the long run, price tends to use-value. If usage provides more than replacement cost, demand potential is automatically increased by the excess. If use value does not equal replacement cost, demand automatically shrivels. The long-time problem of demand thus becomes a matter of controlling use.

Reducing the waste and increasing the efficiency of use seems to be the only reasonable way to counter the inevitable economic tendency to limit demand by the sheer exhaustion of users.

The only truly effective attack on both supply and demand to offset the downpull of economic force seems, therefore, to be improved efficiency: efficiency in living or the subsistence factor, and in production or the profit factor, to improve supply; and efficiency in use to broaden demand.

The unavoidable downward pull of economic force, however, need not cause despair. We climb by means of the very gravitational effects that tend to hold us down. Without the pull of gravity, in fact, we could only float aimlessly and hopelessly about like the spirits in Dante's inferno. Economic forces rightly understood and effectively engineered can likewise prove to be a means of advance rather than assurance of degradation.

The time element in ultimate supply and demand, however, affects various social factors differently. A manufacturing business can generally survive short time difficulties, but it thrives or suffocates over the period of its depreciation life. Its economic focus, therefore, tends to be 15 years. A day laborer, on the other hand, may not be able to survive a month on his own resources so that what happens in a couple of years is meaningless to him. He is, perforce, economically short-sighted. The economic time focus of other people is, of course, similarly limited.

PROFESSIONAL engineers should be able to fit themselves into the general economic order. They should climb by means of the very economic force that pulls them down. Engineers are subject to time limitations like other members of society, often differing from those of management. They should understand the situation, however, and should don economic spectacles to keep the long view in focus. Engineers should strive to improve the efficiency of both production and of use, for in the end the problems of all factors in society are the same.

Perhaps a chief concern of engineers is to determine just what is the proportion of their contribution in society. All ultimate proof is, of course, pragmatic or by trial. Engineers, however, know how to make a little proof go a long way. Engineers who can adapt the prototype and use statistical sampling with assurance, should be able to demonstrate their place in society to themselves and to others without resorting to vicious methods like a strike.

Engineers will rise inevitably to the level of their effective contribution to social betterment, and none can long remain above the level of that effectiveness.

—PP—

"Everything Begins With an Idea," says Peter Gahanka, P. E., of Lorain, Ohio. And he goes ahead and proves that an idea, no matter how far-fetched it may seem at the moment, can be successful if it is put into action and kept in action by plenty of hard work. Here is a success story. It is a story that should make other NSPE members think about their chapter programs. Here is "Everything Begins With an Idea."

SUSPENSION BRIDGE

Between two towers soaring high
A parabolic arc is swung
To form a cradle for the stars;
And from this curve against the sky
A span of gleaming steel is hung—
A highway for the speeding cars.

Between the cable and the span
A web of silver strands is spaced,
With sky above and ships below.
In human dream was born the plan
Of strength and beauty interlaced—
A harp against the sunset glow!

—D. B. Steinman.

A TRUISM, no doubt, but a bit short at getting at the crux of one of life's sweet mysteries. Many have ideas. Some just hibernate; others radiate . . . and percolate, fortunately!

Once upon a time a Director of Engineering had an idea—in his orientation meetings for engineering trainees he would extoll the virtues of Professional Registration (and Society membership) just so that none of his men could ever complain—"Why didn't someone tell me these things?" Which he did. As a result, one day one of his men had an idea—he could conduct a company-sponsored refresher course for any engineers interested in registration. Which he did. As a result, 21 of the plant's engineers are registered; 20 being Society members. Three refresher courses were held with the last one broadened out into a county-wide Chapter-sponsored project. Requests are already being received for the 1953 Fall refresher.

The first idea was that of Ellery R. Fitch, P.E., Director of Engineering—Bendix-Westinghouse Automotive Air Brake Co., Elyria, Ohio; a Past President of Lorain County Chapter, O.S.P.E. Radiations of his idea "percolated" the second idea in the mind of John E. Gilkey, P.E., a member of Fitch's staff.

In the first company-sponsored refresher held in the Fall of 1951 of the 14 enrollees—one gave up, two took the State exams, one was drafted, one left company employ and nine carried over. Of the 23 in the Spring '52 course—6 took the exam and passed (one with the highest E.I.T. grade in the District), 2 were definitely scheduled for the January 1953 exams, 12 more tentatively so and one is biding his time pending his full registration test in 1954. Incidently, two of the above students became instructors in a subsequent course—an idea from an idea from an idea.

Inspired by the success of his two company-sponsored courses, the idea occurred to Gilkey that he could assist other companies in the Chapter area in conducting company-sponsored refresher courses. Which he *almost* did; except that after not too much "percolation" in the Chapter meetings, he wound up with some evening leases on several high school class rooms and a Chapter-sponsored refresher course for the whole county in the Fall of 1952.

Of the 24 enrollees, 10 applied for January 1953 examination and 5 for July 1953 examination. This course broadened out into four branches with 16 taking the Mechanical work, 4 Electrical and 2 each Metallurgical and Industrial.

The course lasted six weeks; 7:00-9:00 P.M. Mondays and Thursdays. Every one took Monday classes which consisted of general Engineering principles and covered the equivalent of the first day of the State Board E.I.T. exams. This course was taught by Gilkey. Thursday classes were given over to the various branches and covered the equivalent of the second day's E.I.T. quizzing. Instructors were George Ternent, P.E.,—Mechanical; E. W. P. Smith, P.E.—Metallurgical; Joseph Girz, E.I.T.—Industrial; and Alan David—Electrical.

TEACHING material consisted of about 50 pages of past examination problems, copies from Case I. T. files and Society members' recollections. Procedure was 30%-50% of class time spent in developing basic fundamental ideas (ideas—again!) from *rock-bottom*. Balance of the time was spent working examples. All students received Multilith copies of all problems. Fees to cover class room rentals, Multilith service and instructors' time were $20 for the six Monday night courses and $25 for all twelve Monday - Thursday classes. Enrollees ranged in age from 22 to 60+ years of age with one whose formal education stopped at the eighth grade. The first two weeks of the Industrial Engineering course consisted of Labor Laws, plant management and incentive systems. The last four weeks was the Mechanical Engineering course.

Mr. Gilkey holds a Bachelor of Mechanical Engineering degree from Ohio State, 1939, and from 1947 to 1951 taught Machine Design and Mechanisms at Case I. T. He also taught the Machine Design section of the Case Refresher courses. He is a native of Canton, Ohio, and joined the Bendix-Westinghouse firm in 1951. He is chairman of two committees of Lorain County Chapter, O.S.P.E. He makes several observations regarding refresher courses. One is that Spring and Fall courses encourage procrastination on the part of potential registrants.

Future courses will be given in the Fall only. Additional branches of study will have to be added due to the increased interest shown in registration attributable to the success of past students. Announcement of the courses is handled by letters to Chief Engineers of industry within the county, newspaper and radio publicity, Chapter promotion. The course is announced as a service to engineers of the Society.

—PP—

(EDITOR'S NOTE: *All those desiring to list their meetings under Dates to Remember should send* COMPLETE *information, including date and place, directly to the American Engineer.*)

Oklahoma Society of Professional Engineers—Annual Meeting, February 6, 7. Biltmore Hotel, Oklahoma City, Oklahoma.

Alabama Society of Professional Engineers—Annual Meeting, February 22-28, (Engineers' Week), Birmingham, Alabama.

Minnesota Society of Professional Engineers—Annual Meeting, February 25, 26. Lowry Hotel, St. Paul, Minnesota.

Professional Engineers of North Carolina—Annual Meeting, February 27, 28, Hotel Barringer, Charlotte, North Carolina.

Georgia Society of Professional Engineers—Annual Meeting, February 28. Ansley Hotel, Atlanta, Georgia.

Ohio Society of Professional Engineers—75th Annual Convention, March 5, 6, 7. Neil House, Columbus, Ohio.

NSPE State Presidents' Conference—March 13, 14. Brown Hotel, Louisville, Kentucky.

Kansas Society of Professional Engineers—Annual Meeting, March 20, 21. Allis Hotel, Wichita, Kansas.

Our quote this month on the contents page of the magazine (page 4) is by a man who has recently been honored by the new President of the United States. He is James B. Conant, former president of Harvard, and he is to be our new U. S. High Commissioner for Germany. Conant's appointment brings to mind a quotation from a booklet he wrote late last year entitled "The Threat to Our National Security." So we close with this thought:

"We act collectively like a man who refuses to believe bad news from his physician; like a person who has always enjoyed good health except for a few bouts with influenza and then is confronted with a grave medical diagnosis that spells out as the only rational course a long, gruelling period of hospitalization, and who then refuses to believe what he has been told. Either refusal to face the facts or a desperate search for a magic pill may be the reaction of such an individual. I submit that to a certain degree this has been the behavior of the American people in the last few years."

Industrial Management Council's Independent Study Bears Out NSPE Findings

Rochester, N. Y., Engineering Manpower Survey

THE new Executive Research Survey Report—*How to Improve the Utilization of Engineering Manpower*—which is reviewed elsewhere in this issue of AMERICAN ENGINEER, offers conclusions and suggestions based on what is really a sort of "national average" in engineering manpower problems. Just how true-to-fact and typical the results of the survey were, however, is pointed up by an independent study that was made by the Industrial Management Council of Rochester, New York, using the forms employed in the national survey but making no attempt to relate the outcome to any other city or area.

Located on Lake Ontario at the mouth of the Genesee River, Rochester is the third largest city in New York State and has a population of approximately 331,000. A center of trade since its earliest days, having access to the most important markets of the East and Midwest not only through its natural waterways but also through such artificial arteries as the Erie Canal and several converging railroads, the city today incorporates an area of about 36 square miles surrounded by the rich farming area of Monroe County.

The diversification and quality of its industry is well known. Employment in the manufacturing industries in the Rochester area in November 1952 was estimated at 112,500. In 1950 it ranked second among 57 major metropolitan areas in the United States in the proportion of professional and technical workers employed.

Since Rochester is generally characteristic in many ways of today's American industrial community, the AMERICAN ENGINEER feels that the report of its Industrial Management Council's independent represents an excellent spot check of the work being done through the Executive Research Surveys. The two-fold aim of the Rochester study was to attempt a determination of the extent of the engineer shortage and to gain information relative to the utilization of engineers being made in the area. The major manpower problems thus found in Rochester are also nationwide problems. Many of the solutions and suggestions that the Survey offers are already being tried effectively in local Rochester industries.

Twenty-four representative companies participated in the Rochester Council's survey. The fields of manufacturing and sales covered by this selection were: machinery (except electrical), photographic equipment and supplies, electrical equipment, cosmetics, food and kindred products, lithography and printing, men's accessories, instruments, chemicals, plastics, optical instruments, fabricated metal products, business machines, and public utilities. The participating companies operate 139 major plant locations throughout the United States. Replies to the Rochester area survey covered 40 of these plants with 82,000 employees, of which 2,700 are engineers.

The study showed that in 19 of the companies an average of 3 out of 4 engineers spend at least 75 per cent of their time in technical engineering work. Twenty-one of the companies queried disclosed that 25 per cent of their current production is devoted to defense work.

DESPITE an appreciable upswing in the number of engineers employed since June 1, 1951, the current nationwide shortage of engineers was reflected in the replies of 16 companies with resultant operational restrictions in research and development, production, and distribution. Eight companies indicated no present shortage; but these, with the exception of only two, are non-durable goods industries.

Continued study and review of their engineering positions was felt by many of the companies to be the best approach to the problem of increasing the effectiveness of the existing staff. Utilization of young, inexperienced men under the guidance of older, experienced engineers; training programs and upgrading; departmental specialization, standardized design, and improved office layout; increased contact and cooperative planning with production, inspection, and sales staffs; the production efficiency bonus; and the use of reproduction processes which eliminate drawing and other engineering time were also noted by various companies as means to increase staff efficiency.

Seventeen of the Rochester companies reported that they found it feasible to use supporting personnel for subordinate and more routine engineering work to release the professional men for the more creative or more involved technical projects. They indicated that much clerical detail can be separated from the engineering job proper. Technical school graduates, they replied, can do certain routine work; repetitive testing can often be handled by non-engineers, as can many elementary engineering duties. The employment of expert machinists, laboratory technicians, draftsmen, and mathematicians can also afford considerable delegation of work by the engineers. However, five companies replied "No," to the question of using supporting personnel, and two did not comment.

To meet the engineering shortage, a number of the companies have relaxed their hiring standards: 7 on education, 7 on experience, 6 on age, and 3 on physical condition. Part-time personnel are also employed in some instances, and several companies use non-citizen engineers. Four companies stated that they employ women engineers, and 11 others said they would use them if available.

OUTSIDE engineering consultant firms, research organizations, retired engineers, and drafting contract firms are among the other resources tapped by the Rochester companies to help carry their work loads.

Only a small minority of the companies reported personnel turnover as a particular problem, but those who did so attributed it in large part to high wages offered in new defense industries. Company-sponsored benefit and incentive programs were generally regarded as the best insurance against turnover.

With regard to engineers liable for military service, 11 companies indicated that they had asked for selective service deferments of young engineers with about 87 per cent of their requests approved. Nine companies had requested deferments for engineers with reserve status with approval in 79 per cent of the cases.

Emphasis was placed on the assistance being tendered to qualified potential engineers. Eleven of the 24 companies furnish summer employment to college engineering students, and 10 follow definite programs aimed at promoting interest in the profession at either or both the college and high school levels, with one company also working with college graduates in allied fields. Sponsoring "Career Days" and plant visitation programs, paying a portion of tuition, and furnishing visual aids and printed matter are among the methods used.—***End.***

Uncle Sam Calleth . . .

Do You Know Your Federal Taxes?

Come the Ides of March—comes also federal income tax time. Do you know your federal taxes—what they can do to you—what you can do to them? Try this three-minute tax quiz. (Editor's note: three minutes if you're an expert.) It is based on material furnished by the American Institute of Accountants, the national professional society of certified public accountants. Now twist the page for answers. No peeking, please!

1. Your son worked for you in the business last summer, and you paid him a total of $591. He also won $10 in an advertising slogan contest. You can—
   a. Take a full $600 dependency exemption for him.
   b. Take a half exemption.
   c. Take no exemption.

2. While on vacation with your wife last summer, you entertained several men you do business with. Is this—
   a. Deductible as a business expense?
   b. Not deductible, since you were vacationing?
   c. Deductible only if you and your wife file a joint return?

3. You made a non-business loan of $2,000 to a friend last March, and he promptly disappeared, leaving absolutely no trace. You can probably—
   a. Deduct the full amount as a bad debt on your 1952 return.
   b. Deduct only half of it.
   c. Take no deduction at all.

4. You earned more than $3,600 in your business. The social security tax is—
   a. Not levied on your own income.
   b. $81, paid with your income tax return.
   c. $54, paid to the Social Security Board.
   d. $54, paid with your income tax return.

5. Which of the following contributions is not deductible?
   a. Your local Community Chest
   b. The American Legion.
   c. A political party.
   d. The YMCA.

6. You failed to take all your allowable deductions on your 1950 return. You can—
   a. No longer file a claim for a refund.
   b. File a refund claim as late as 1954.
   c. Stop worrying, since you will get a refund automatically.

7. Your wife works for you in your business. She—
   a. Is required to pay social security.
   b. Is not subject to social security.
   c. Can choose whether she does or does not want social security coverage.

8. In December, you spent $1,000 for built-in bookshelves and wall-to-wall carpeting for your office, on which your lease has three years to run. You can—
   a. Deduct the $1,000 on your 1952 return.
   b. Amortize the cost over the next three years.
   c. Depreciate it over the life of the furnishings.

9. There are a few leaks in the shingle roof of your office building, so you construct a new tile roof. Taxwise, the cost is—
   a. Deductible as a repair.
   b. Deductible in the current year as an improvement.
   c. Depreciable—a portion deductible each year of its useful life.

10. In determining your taxable income, which of the following taxes you pay is *not* allowed as a deduction?
   a. Real estate tax.
   b. State income tax.
   c. State inheritance tax.
   d. Motor vehicle license fee.

Now Twist the Page for Correct Answers

Are You a Tax Expert?

Here are the correct answers. Honestly, how did you do?

1. c. Your son's prize here would be considered taxable income. That raises his total income to $601, and he cannot qualify as a dependent if he has income of $600 or more.

2. a. The amounts should be deductible as business expenses, if you kept a careful record which lists them in detail, and shows clearly that the entertainment was with a predominating business motive and not merely reciprocal, or incident to the vacation.

3. b. A non-business bad debt is a capital loss. And you can take only $1,000 a year in capital losses—unless you can apply them against capital gains. You are allowed to carry over unused losses for five years; better get expert advice.

4. b. Assuming your income is classified as self-employment income (see tax instructions) and is not from engaging in an exempt profession, a tax of 2¼% on the first $3,600 is due with your income tax return—so you owe $81.

5. c. You cannot deduct contributions to an organization which spends a substantial part of its time on lobbying or political propaganda.

6. b. In this case, you can file a claim for refund within three years from the date your return was due.

7. b. If your wife works for you, you are not supposed to pay social security taxes on her salary, nor is she supposed to make her contributions.

8. b. On leased property, you normally spread the cost of improvements over the life of the lease.

9. c. The roof is an improvement, not deductible currently like ordinary repairs. Its cost is deductible as depreciation spread over its estimated useful life.

10. c. Inheritance taxes are not deductible. The others listed are deductible.

With Our Members . . .

Engineers' Week

Reports From Around The Country Indicate Successful Celebration Lies Ahead

As this issue of your AMERICAN ENGINEER goes to press reports are beginning to come in on planned State Society and Chapter activities for National Engineers' Week, scheduled for February 22 through 28, 1953. Everything indicates that the observance throughout the country will be most successful.

Several of the State Societies, including Alabama, Georgia, and Minnesota, have scheduled their annual meetings to coincide with the Engineers' Week celebration dates.

The Ohio SPE annual convention is scheduled for March 5, 6, and 7 in Columbus, which dates will culminate a two-week period of celebration commemorating the Society's Diamond Jubilee as well as the Engineers' Week observance. Kick-off event for this program will be the Columbus Town Meeting on February 22. The theme selected is *How To Prepare for a Productive and Happy Life in A Machine Age*, and the featured speakers will be Senator Ralph E. Flanders of Vermont, NSPE President John D. Coleman, and Phillip Swain, the editor of *Power*. The program will be broadcast over Columbus TV and radio facilities.

The Cleveland SPE has a special TV show scheduled for February 22 and is also planning appropriate window displays in downtown spots. Luncheon speakers to discuss the subject, *Engineering—Key to Progress*, are also being selected.

In New York, plans are moving ahead for the State Society's observance of the occasion under the chairmanship of Engineer William Perry of Binghamton.

Oscar Pederson is taking charge of plans made by the Tulsa Chapter of the Oklahoma Society.

Gilbert Carter is chairman of the Engineers' Week arrangements being made by the Professional Engineers of Colorado, and Leonard Mitchell is assisting in display planning.

In Kansas, members of the Topeka group are working under the general chairmanship of Bert Mowry. He has appointed the following engineers to various sub-chairmanships; W. W. Mains, radio and television; H. A. Marshall, publicity; Walter Johnson, public speaking; and H. B. Bartlett, special projects. Similar plans are also going ahead in the Wichita Chapter where Alden Trovillo is acting in charge of the committee for public speaking.

The Macon Chapter of the Georgia SPE has enlisted the active support of the Fort Valley *Leader-Tribune*, edited by Mr. Dan Grahl; the NSPE tape-recorded radio program is scheduled for broadcast over stations in both Fort Valley and Macon; and chapter members are planning to take at least five interested high school seniors on a tour of the Georgia Institute of Technology sometime during the celebration week.

From the Virginia Polytechnic Institute, Blacksburg, Virginia, comes word of a special program being planned by the engineering students, who are sponsoring their Fourth Annual Engineering Conference from February 17 to 19, just prior to Engineers' Week.

Members of the various Ohio SPE student chapters are making plans for exhibits to be shown in connection with the engineering celebration and the Ohio Diamond Jubilee.

Other plans reported from around the country also give promise of an outstanding National Engineers' Week for 1953.

Plans For Oklahoma Convention Completed

February 6 and 7 will mark the annual convention of the Oklahoma Society of Professional Engineers at the Skirvin Hotel in Oklahoma City. A number of interesting panel discussions and lectures have been scheduled and a social program has been planned in addition to the regular business activities.

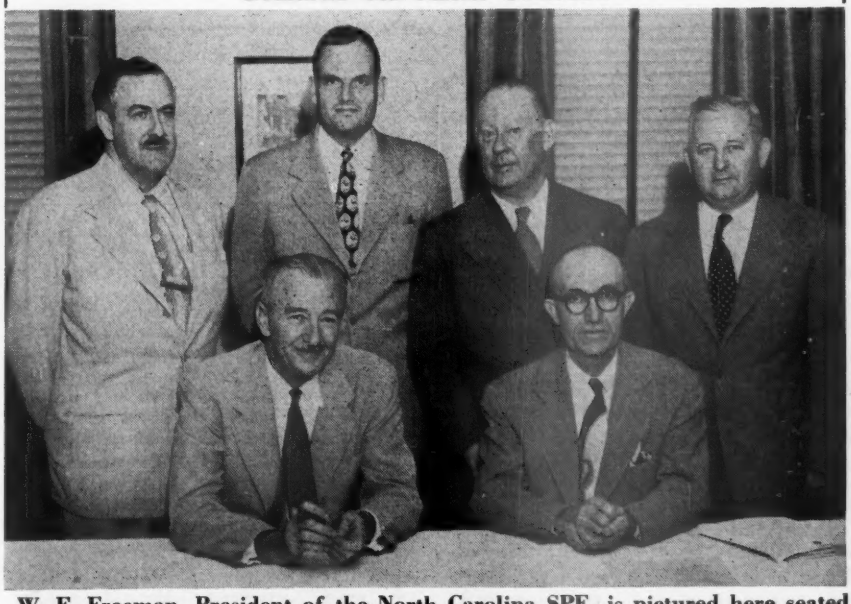
One of the highlights of the convention will be a joint meeting with the Oklahoma City Chamber of Commerce at which Engineer L. L. Dresser will deliver a talk on *The Engineer and His Civic Responsibilities*.

Registration Certificates Presented In New York

Seven New York State SPE chapters—Bronx, Kings, Nassau, New York, Queens, Richmond, and Westchester—recently joined in sponsoring the presentation of professional engineering licenses to newly qualified engineers. The presentation ceremony was held at the Statler Hotel in New York City, with George J. Nicastro giving the welcoming address and Newell L. Freeman, Secretary of the New York State Board of Examiners of Professional Engineers and Land Surveyors, awarding the certificates.

William H. Larkin, a past president of NYSSPE, delivered an address on *Professional Licensure*. Herbert F. Roemmele, president of the New York Chapter, presided at the event.

Central Carolina Officers



W. F. Freeman, President of the North Carolina SPE, is pictured here seated next to L. E. Wooten, President of the newly-organized Central Carolina Chapter. Others in the photo, standing left to right, are Prof. Robert B. Rice, Governor of the State Society, and J. D. Joslin, W. E. Harris, and Bernard Crocker—respectively Secretary, Vice President, and Director of the new Chapter. Other Directors not pictured are Dean W. H. Hall and John Gove.

Civil Defense

Pennsylvania SPE Secretary Inaugurates Lincoln Chapter CD Project on TV Program

John T. West, Jr., the executive secretary of the Pennsylvania Society of Professional Engineers, recently "kicked off" the Lincoln Chapter's participation in the Federal Civil Defense Administration's Engineering Equipment Inventory with an explanatory address delivered over station WGAL-TV in Lancaster.

The FCDA has selected 20 typical counties throughout the country and requested the professional engineers in each to obtain and tabulate information as to the number of scrapers, power shovels, back hoes, derricks, gasoline and engine driven generators, portable pumps, water purification equipment, dump trucks, and other vital equipment available. The data obtained from these "test" counties, in addition to being made available to local and state Civil Defense authorities, will be projected for other counties of like nature to obtain an over-all view of the homefront defense equipment picture.

Lincoln Chapter members who are giving their time to conduct the local survey include: E. L. Dryer, chief project engineer, Armstrong Cork Company; John J. Wisler, president of United Sound and Signal Company; Melvin H. Peters, president of Warfel Associates; Raymond K. Strayer, chief engineer, Posey Iron Works; G. A. Reinhard, Jr., chief engineer of the Armstrong Cork Company; Robert S. Mayo, a tunnel and mine consultant; and J. Haines Shertzer, engineer for the city of Lancaster.

Former Diplomat Speaks In Augusta, Ga.

Hugh Grant, an Augusta radio executive and former U. S. minister to Albania and Siam, addressed the members of the Augusta Chapter of the Georgia SPE at their 1952 year-end meeting. His lecture dealt with the complex international problems that lie ahead for President Eisenhower, and he warned against the over-extension of United States power and commitments.

"I still think," Mr. Grant said, "that Stalin's strategy is to get us spread out thin here and there and destroy us in bankruptcy through economic collapse at home." The new President's greatest problem, he asserted, will be to find a means for firm and forthright dealing with the Russians without involving the world in a third great war.

Peninsula, Cal., Chapter Meeting Reports

A recent dinner meeting of the Peninsula Chapter of the California SPE featured talks by Dale Keeley, president of the Bay Area Chapter, and Roger D. McCoy, a member of the local group. The Pioneer Hotel in Woodside was the scene of the dinner, which was presided over by chapter vice-president C. D. Allen.

There was no guest speaker at the chapter's general business meeting in January, but a color film of the 1952 Mobilgas stock car economy run, which was made from Los Angeles to Sun Valley, Idaho, was shown as an entertainment feature.

Plans are now under way for the chapter's Annual Dinner meeting in June.

Wichita Engineers Hear Television Talk

John Huff, division maintenance supervisor of the Southwestern Bell Telephone Company, Wichita, spoke on *Television in the Bell System*, at a recent meeting of the Wichita, Kansas, SPE. Mr. Huff, an engineering graduate of Kansas State College, included a discussion of the Kansas Microwave Relay System in his address.

Correction To Annual Report

The Annual Report, recently distributed to the membership, covering the 1951-52 administrative year, inadvertently omitted the name of John F. Reynolds, of Jacksonville, Fla., in the listing of officers. Mr. Reynolds served as Vice President for Southeastern Area during the period covered in the report.

It is deeply regretted that this error occurred. Mr. Reynolds served the Society with distinction and diligence as a Vice President and also headed the Ethical Practices Committee.

Annual Dinner Meeting In Tulsa

The Annual Dinner Meeting of the Tulsa Chapter of the Oklahoma Society of Professional Engineers was held Friday evening, January 9, at the Tulsa University Student Union Building. The meeting, which featured the installation of the new officers elected at the December meeting, was presided over by Engineer Harold Meyer, acting as master of ceremonies.

Oklahoma A & M's Dean of Engineering, Edward R. Stapley, was guest speaker at the dinner. His talk was entitled *Slide Rules and Cupboard Doors*.

A. C. Young was in charge of ticket reservations for the meeting, and supplemental entertainment was arranged by the Ladies' Auxiliary.

Johnstown Stand Against Unionism

At a recent meeting, the Board of Direction of the Johnstown Chapter of the Pennsylvania Society unanimously endorsed the NSPE's *Statement of Principles Regarding Collective Bargaining by Professional Employees*. The Board is composed of three practicing consulting engineers, one a professor of engineering, and eight engineers employed by industry; they are elected to office by local PSPE members.

Galveston County Installs New Officers

The Galveston County Chapter of the Texas Society of Professional Engineers held its Annual Dinner at the Elks Lodge in Galveston on December 12. Guest speaker at the event was Dr. C. M. Pomerat, University of Texas Medical Branch.

New officers were introduced during the course of the evening. They included: Paul J. Hurd, President; Frank K. Webb, First Vice-President; C. W. Warren, Second Vice-President; and Matthew C. Wilson, Secretary-Treasurer. The chapter's new Executive Board will be made up of the following: Kenneth A. Campbell, J. W. Keith, G. M. Dent, Ersel Lantz, A. W. Guill, George M. Brady (State Director), and E. M. Grimes. Engineer Grimes is the retiring president of the chapter.

The 1952 Annual Report, surveying the year's accomplishments and activities, was also distributed to the members.

Atlanta Chapter Holds Annual Meeting

The recent Annual Meeting of the Atlanta Chapter, Georgia SPE, was one of the most successful in the chapter's history. One hundred thirty members and their ladies were present for the December dinner at the Piedmont Driving Club.

Highlight of the evening was an address by D. W. Brooks of Atlanta, a nationally-known agriculturist and an outstanding authority on world economics. His talk dealt primarily with the problem of Communism and conditions existing behind the Iron Curtain. Mr. Brooks, who has been serving on the President's War Mobilization Board, has recently been appointed to a post in the Department of Agriculture by President Eisenhower.

Another feature of the meeting was the installation of the new officers for 1953 by retiring chapter President Albert W. Rose. The new officers are: E. W. Klein, President; Orbie Bostick, Vice-President; Charles Lyons, Secretary; Felix deGolian, Treasurer; Boynton Cole, State Director; Henry Robison, State Director; James Staples, Chapter Director; and MacRae Williams, Chapter Director. Homer Weber and Eugene Bonds were also retained as Chapter Directors for the 1953 term.

Among the distinguished guests at the event were A. Stanford, a former national President of NSPE, and J. B. McCrary, president of the J. B. McCrary Company, the oldest practicing professional engineer in the State of Georgia, and a member of the first graduating class at Georgia Tech.

A program of musical entertainment was also furnished for the evening.

Arkansas SPE Reports On Meetings

The Arkansas Society of Professional Engineers reports two fall-winter meetings to date, one in October and the other early in December, both held in Little Rock.

Dr. John Tyler Caldwell, president of the University of Arkansas, was speaker at the first meeting. T. Carr Forrest was guest lecturer in December at the luncheon; an evening banquet on the same day featured entertainment presented by Art Briese, a nationally known humorist.

Both the October and December events were preceded by directors meetings, and a general business session was held after the December luncheon.

Atlanta Meeting Scenes

Appearing at the Atlanta Chapter's Annual Meeting, seated left to right above, are: Mrs. D. W. Brooks, Mr. D. W. Brooks, the main speaker, and Mr. A. W. Rose, retiring President. Standing are: Mrs. J. M. Staples; Mr. J. M. Staples, program committee chairman; Mrs. A. W. Rose; Mr. E. W. Klein, incoming President; and Mrs. Klein.

Below is a general view of the Piedmont Driving Club ballroom during the event.

Philadelphia Activities

Chapter Receives Defense Commendation

The Philadelphia Chapter of the Pennsylvania Society was recently awarded the Certificate of Appreciation of the Philadelphia Defense Council in recognition of the work of its members in the Center City Survey of potential atom bomb shelters. Seventy-five chapter volunteers contributed their time to making the survey under the chairmanship of Engineer Merz who received the certificate from Mayor Clark on behalf of the chapter in a City Hall presentation ceremony.

The December dinner meeting of the chapter was highlighted by an address delivered by Allan G. Mitchell who is an active member of the Citizens' Council on City Planning and former president of the Council. He spoke on the Penn Center Plan which has been proposed for the redevelopment of the so-called "Chinese Wall" area of the city. Mr. Mitchell is associated professionally with the Philadelphia Electric Company.

The group's January meeting featured a talk by H. P. Adams, meteorologist in charge of the Philadelphia Weather Bureau. Dr. Charles W. MacGregor, vice president in charge of Engineering and Scientific Studies at the University of Pennsylvania, was also honored at the meeting.

Officials of NSPE Ladies' Auxiliaries

The following list of auxiliary presidents and representatives to the NSPE Ladies' Advisory Committee has been compiled by the Committee under the chairmanship of Mrs. William J. Fell. Monthly meeting dates have also been included where available. It is hoped that this information will prove of value to wives of professional engineers in establishing contact with each other in all parts of the country. New auxiliaries should submit similar information to Mrs. Fell (2808 E. 20th St., Tulsa, Okla.) as soon as it is available.

Northeastern Area

Monmouth-Ocean Chapter Auxiliary,
New Jersey SPE, Lavalette, N. J.
Pres., Mrs. Kenneth Fox, 105 Woodland Drive, Fair Haven, N. J.
Rep., Mrs. Paul Austin, Toms River, N. J.
Meeting date: First Wednesday.

Connecticut SPE Auxiliary,
Hartford, Conn.
Pres., Mrs. Clifford Reuther, 14 Fenway, Milford, Conn.
Rep., Mrs. C. N. Wiley, Fenway East, Milford, Conn. (Also *Vice-Chairman,* Advisory Committee, Northeastern Area.)

Southeastern Area

Chattanooga Chapter Auxiliary,
Tennessee SPE, Chattanooga, Tenn.
Pres. and Rep., Mrs. Beryl L. Merrill, 294 Franklin Road, Lookout Mountain, Tenn. (Also *Vice-Chairman,* Advisory Committee, Southeastern Area.)
Meeting date: First Tuesday.

Central Area

Mahoning Valley Chapter Auxiliary,
Ohio SPE, Youngstown, O.
Pres., Mrs. Richard E. Evans, 553 Redonda Rd., Youngstown, O.
Rep., Mrs. E. J. Salvidge, 432 W. Ravenwood, Youngstown, O.
Meeting date: Fourth Wednesday.

Franklin County Chapter Auxiliary,
Ohio SPE, Columbus, O.
Pres., Mrs. C. E. Bischoff, 2835 County Line Rd., Westerville, O. (Also *Vice-Chairman,* Advisory Committee, Central Area.)
Rep., Mrs. Lloyd A. Chacey, 191 Worthington-Galena Rd., Worthington, O.
Meeting date: Third Tuesday.

T. Jackson Moore Chapter Auxiliary,
West Va. SPE, Clarksburg, W. Va.
Pres. and Rep., Mrs. Howard B. Yost, 122 Euclid Ave., Clarksburg, W. Va.
Meeting date: Third Tuesday.

Grand Valley Chapter Auxiliary,
Michigan SPE, Lansing, Mich.
Pres., Mrs. C. K. Wirth, 203 Durand, East Lansing, Mich.
Rep., Mrs. Otto H. Hall, 1414 Sunnyside, Lansing, Mich.

Central Illinois Chapter Auxiliary,
Ill. SPE, Decatur, Ill.
Pres., Mrs. Floyd E. Troxell, 1544 E. Main Street, Decatur, Ill.
Rep., Mrs. Alex Van Praag, Jr., 1347 W. Sunset, Decatur, Ill.
Meeting date: Second Tuesday.

North Central Area

Jefferson City Chapter Auxiliary (Wives of Professional Engineers),
Missouri SPE, Jefferson City, Mo.
Pres., Mrs. George Wolf, 2034 W. Main, Jefferson City, Mo.
Meeting date: Second Tuesday.

Tri-Valley Chapter Auxiliary,
Kansas SPE, Mankato, Kan.
Pres., Mrs. Gene Mayse, Box 211, Mankato, Kan.
Meeting date: Four times yearly.

Southwestern Area

Arkansas SPE Auxiliary,
Little Rock, Ark.
Pres., Mrs. F. L. McDonald, 1725 North Monroe, Little Rock, Ark.
Rep., Mrs. R. J. Rhinehart, 3500 Cherry St., Pine Bluff, Ark.
Meeting date: Four times yearly.

Central Oklahoma Chapter Auxiliary,
Oklahoma SPE, Oklahoma City, Okla.
Pres., Mrs. H. L. Pickens, 2629 N. W. 25th St., Oklahoma City, Okla.
Rep., Mrs. W. L. C. Williams, 2202 Guilford Lane, Oklahoma City, Okla.
Sec., Advisory Committee, Mrs. Roy Black, 2624 N. W. 27th St., Oklahoma City, Okla.
Meeting date: Third Thursday.

Tulsa Chapter Auxiliary,
Oklahoma SPE, Tulsa, Okla.
Pres., Mrs. Cline L. Mansur, 2636 S. Trenton, Tulsa, Okla.
Rep., Mrs. Leo Fagg, 3007 S. Boston Place, Tulsa, Okla.
Meeting date: Fourth Wednesday.

Ft. Worth Chapter Auxiliary
(Wives of Professional Engineers)
Texas SPE, Ft. Worth, Tex.
Pres. and Rep., Mrs. Paul C. Gregory, 215 Lindenwood, Ft. Worth, Tex.
Meeting date: Third Thursday.

Dallas Chapter Auxiliary,
Texas SPE, Dallas, Tex.
Pres., Mrs. P. G. Wallace, 3836 Greenbrier, Dallas, Tex.
Rep., Mrs. Elgin B. Robertson, 919 Thomason Drive, Dallas, Tex.
Meeting date: Fourth Wednesday.

Travis Chapter Auxiliary,
Texas SPE, Austin, Tex.
Pres., Mrs. Trigg Twichell, 1317 Ardenwood Rd., Austin, Tex.
Rep., Mrs. John Ledbetter, 2007 Hope Trail, Austin, Tex.
Meeting date: Third Wednesday.

Bexar Chapter Auxiliary,
Texas SPE, San Antonio, Tex.
Pres., Mrs. D. R. Ward, 134 Oak Park Estates, San Antonio, Tex.
Rep., Mrs. O. T. Lodal, 217 Castano, San Antonio, Tex.
Meeting date: First Tuesday.

Galveston Chapter Auxiliary,
Texas SPE, Galveston, Tex.
Pres., Mrs. E. M. Grimes, 2306 Scott St., LaMarque, Tex.
Meeting date: Second Thursday.

Nueces Chapter Auxiliary,
Texas SPE, Corpus Christi, Tex.
Pres., Mrs. Lewis H. Jones, Jr., 1514 Devon, Corpus Christi, Tex.
Rep., Mrs. M. H. Allen, 1201 Annapolis Drive, Corpus Christi, Tex. (Also *Vice-Chairman,* Advisory Committee, Southwestern Area.)
Meeting date: Second Thursday.

Panhandle Chapter Auxiliary,
Texas SPE, Amarillo, Tex.
Pres., Mrs. L. J. Roberts, 3606 Lipscomb, Amarillo, Tex.
Rep., Mrs. Wm. H. Neubauer, 3415 West Tenth St., Amarillo, Tex.
Meeting date: Second Tuesday.

South Plains Chapter Auxiliary,
Texas SPE, Lubbock, Tex.
Pres., Mrs. Wm. B. Holmes, 2608 Thirty-second St., Lubbock, Tex.
Rep., Mrs. Henry Mathieu, 3606 Twenty-first St., Lubbock, Tex.

Northeast Texas Chapter Auxiliary,
Texas SPE, Paris, Tex.
Pres., Mrs. W. F. Hicks, 325 Eighth N. E., Paris, Tex.
Meeting date: Bi-monthly.

Sabine Chapter Auxiliary,
Texas SPE, Beaumont, Tex.
Pres., Mrs. Charles T. Davidson, 2109 East Drive, Beaumont, Tex.
Rep., Mrs. L. V. Norris, 2442 Gladys, Beaumont, Tex.

Western Area

Los Angeles Chapter Auxiliary (Wives of Engineers—WOES),
Calif. SPE, Los Angeles, Calif.
Pres., Mrs. Kenneth D. Harrington, 10343 E. Schmidt Rd., El Monte, Calif.
Rep., Mrs. Donald R. Stoneman, 6666 W. 87th Place, Los Angeles, Calif. (Also *Vice-Chairman,* Advisory Committee, Western Area.)
Meeting date: Second Tuesday.

Bay Area Chapter Auxiliary,
Calif. SPE, San Francisco, Calif.
Pres., Mrs. Herman Spaeth, 135 Fourteenth Ave., San Francisco, Calif.
Rep., Mrs. Dan Lucchetti, 1618 Thirty-fourth Ave., San Francisco, Calif.
Meeting date: First Wednesday.

News Of Colorado P.E.'s

The December meeting of the Professional Engineers of Colorado featured a talk on *What Makes TV Tick.* The speaker was N. O. Pierce, Colorado Service Superintendent of the Mountain States Tel. & Tel. Company. With the aid of a technical assistant, he also presented several practical demonstrations. The meeting was held at Cunningham's Restaurant in Denver.

The highlight of the group's January meeting was a panel discussion of the NSPE's study of engineering manpower utilization.

Economics Lecture At Chambersburg

Because of the interest of professional engineers in national and world welfare, the officers of the Franklin Chapter of the Pennsylvania SPE recently scheduled a lecture on *Economic Conditions in Europe as Affecting the United States* as a feature of their dinner meeting in Chambersburg. The speaker was Leo Miller, an attorney from Hagerstown and a speaker of note. The site of the meeting was the Chambersburg College Inn.

Springfield, O., Meeting Features Management Talk

Byron Sandles, manager of the Clark County Fair and an authority on fair management practices was guest lecturer at the January meeting of the Springfield Chapter of the Ohio SPE. A short play given by local high school students was another feature of the program which was specially arranged for Ladies' Night.

P. E. Byron Winkler is the new president of the Springfield Chapter for 1953. He succeeds North Newton in that office.

Letters

(*Continued from page* 3)

power should then be sold to private enterprise for distribution or for augmenting their own capacities.

This seems, to me to be a logical and fair solution, but which, for some strange reason, neither the private companies nor the public power boys have given any serious consideration. Both sides insist on whole hog or nothing.

R. B. COLEMAN, JR.,
P.E., Attorney at law,
Birmingham, Ala.

Engineers ? ? . . .

Dear Editor:

I am convinced that the greatest of troubles with our attempts at being professional people is our complete inability to prevent everyone and anyone who sees fit to call themselves engineers. I have particular reference to firm names such as "carpet engineers," "floor covering engineers," "The John Doe Engineering Company" (which incidentally never hired an engineer in its existence), engineers who fire boilers, engineers who run locomotives, engineers who run stationary engines, and the widely publicized "flight engineer," etc.

During the recent strike by flight engineers of the Eastern Airlines organization, I had several friends ask if I belonged to that union and what the strike of engineers was all about. I do not know how many men of the Eastern Airlines Call Board are graduate engineers but, under any circumstances, it would seem to me they would far better be called "enginemen" or something to indicate their true identity.

Just try to imagine how long your local family doctor would allow the corner barber to call himself a "hair doctor"; the hearing aid salesman to call himself an "ear doctor;" and the yardman to set himself up as a "G. D."—Doctor of Grass.

Our weakness is in trying to include everyone and not setting up a classification of exactly what constitutes an engineer. A doctor or a lawyer could no more set up his services for sale without first passing his State or qualification examination, than he could fly to the moon. Anyone who desires can do as he pleases about calling himself an Engineer and he is aided in so doing by all of the actual engineers who do nothing about it.

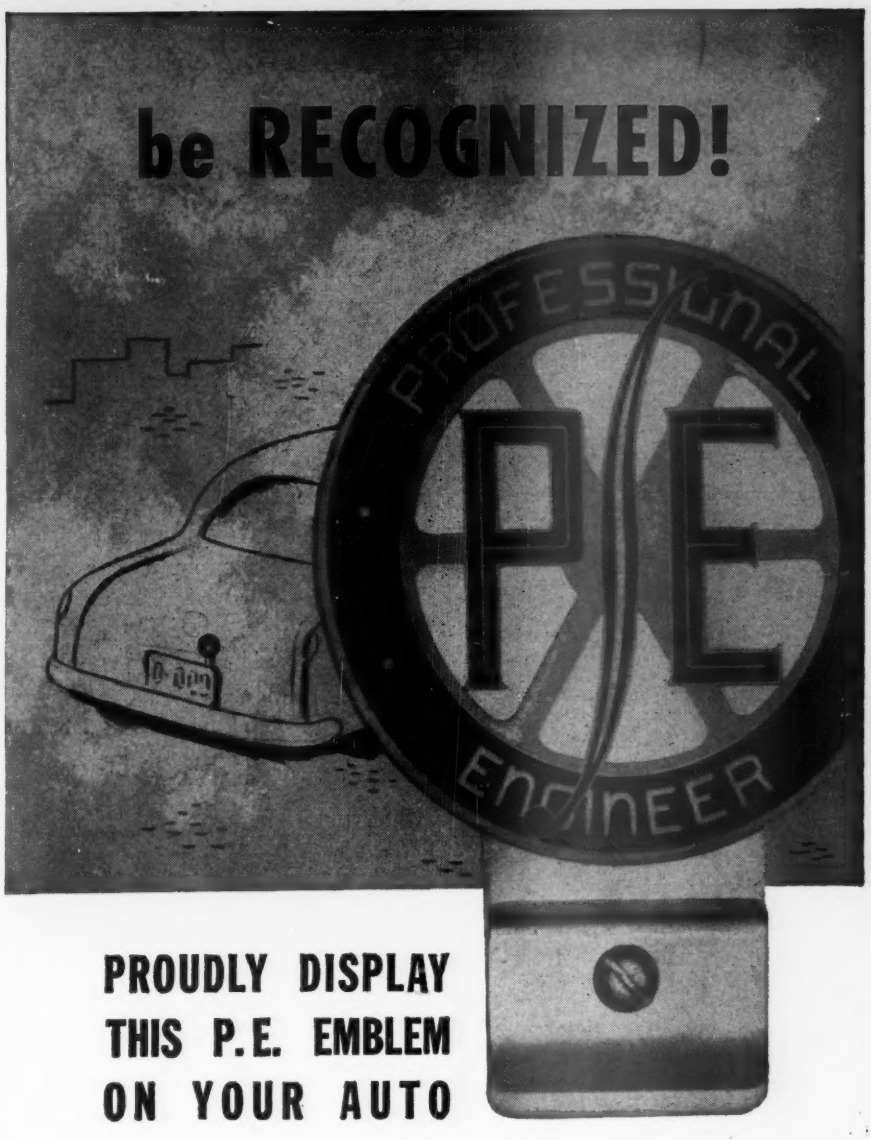
We must eventually have some form of license which qualifies the individual to sell his services and this detail of license must have teeth to stick when applied.

Until we do, I'm confident the vast majority of engineers (most of them not licensed) would be far better off in a union where their hourly wages would be elevated to that of the carpenter, brick mason, electrical man, machinist, or bus driver.

This is certainly not a happy thought nor a desirable one; however, unless we discipline ourselves, the union bosses will step in and do it for us. It is a mystery to me how we have come so far without having a would be UEW or some such thing. Engineering is the main factor in our great industrial system and how some of the smart union bosses have overlooked this field is remarkable. They could completely stop operations and the power of their strike would be terrific if they called out all engineers from the Vice President in Charge of Engineering, through the Chief Engineer, on down to the draftsman. The union bosses have certainly missed the boat.

Let's hope they keep missing the boat until we can do something about it.

JAMES M. FISKE, P.E.,
Orlando, Fla.



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